Biological
& Medical

Vol. XXXII Part 4.

REC'D MAY 11 1921

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THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

STORAGE

APRIL
1921

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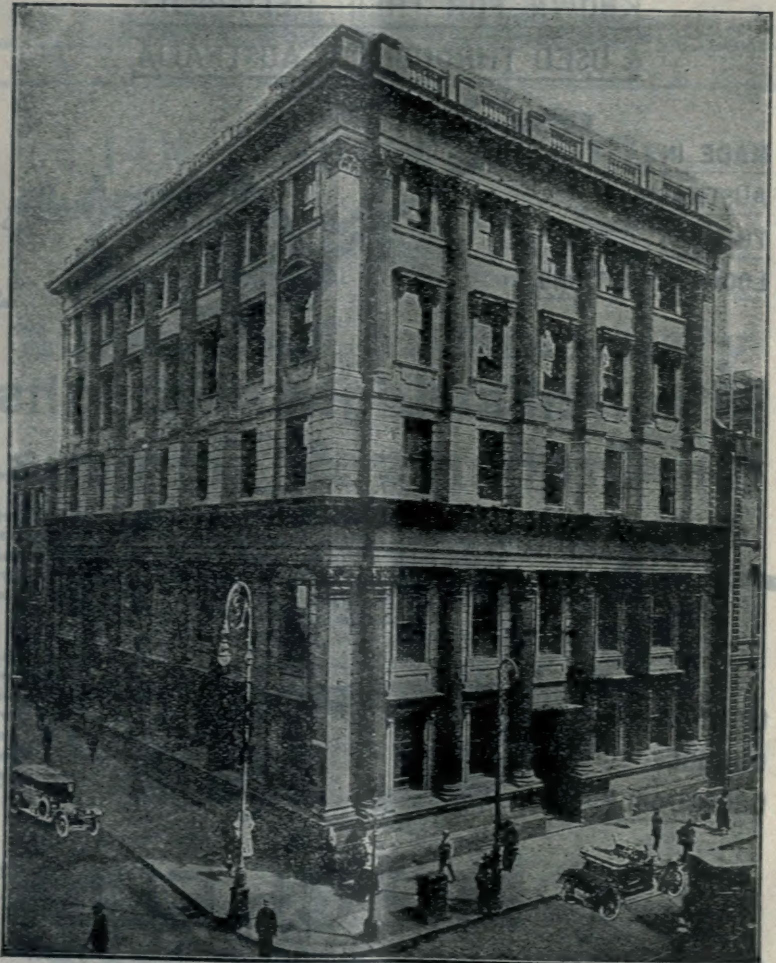

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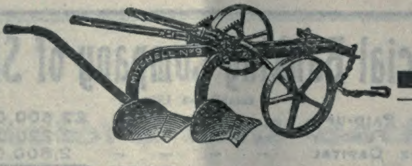

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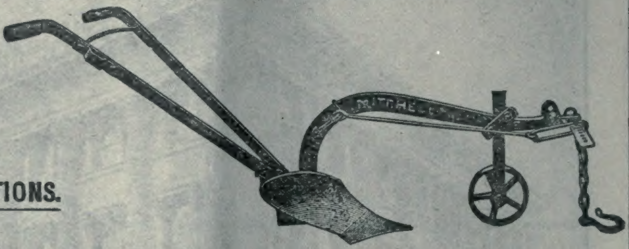

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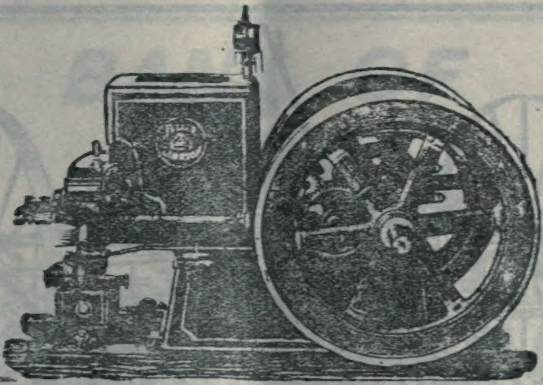

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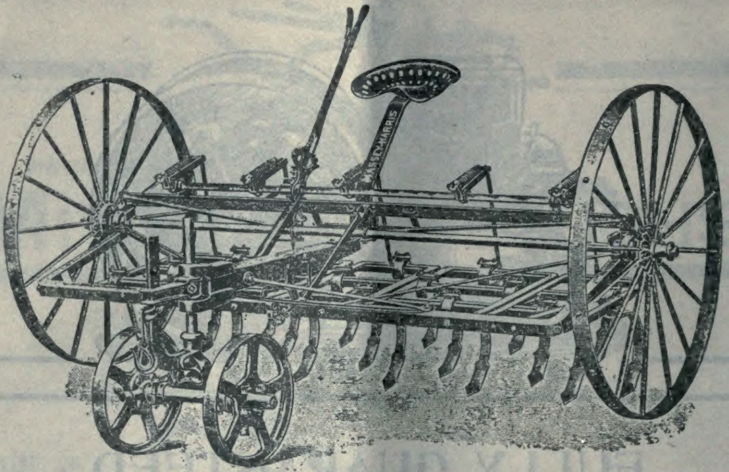

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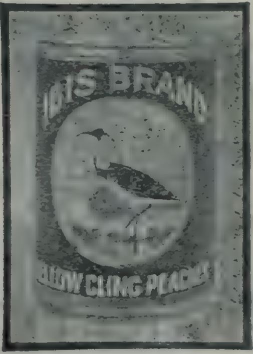

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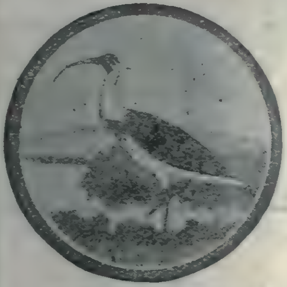

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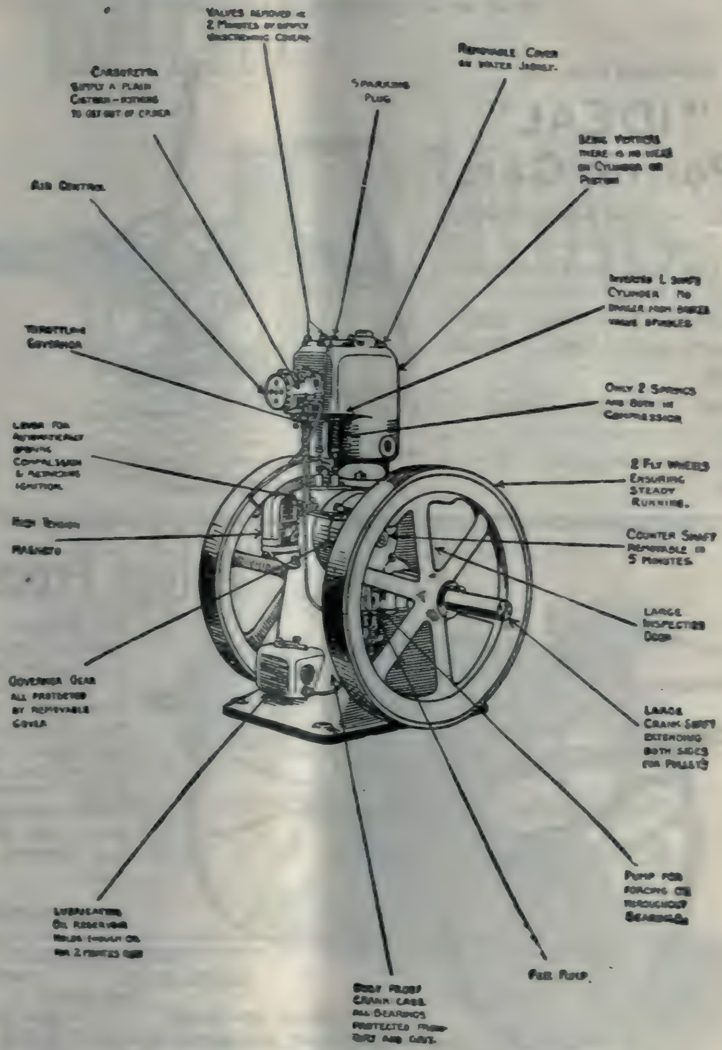
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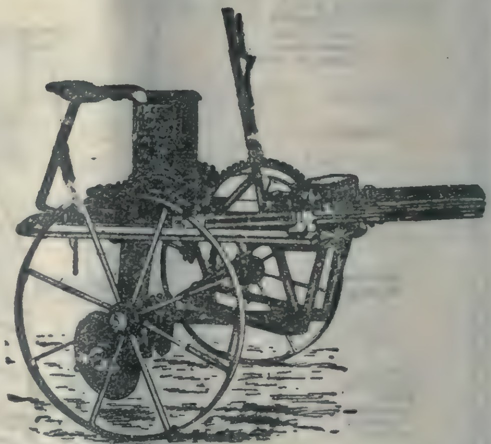

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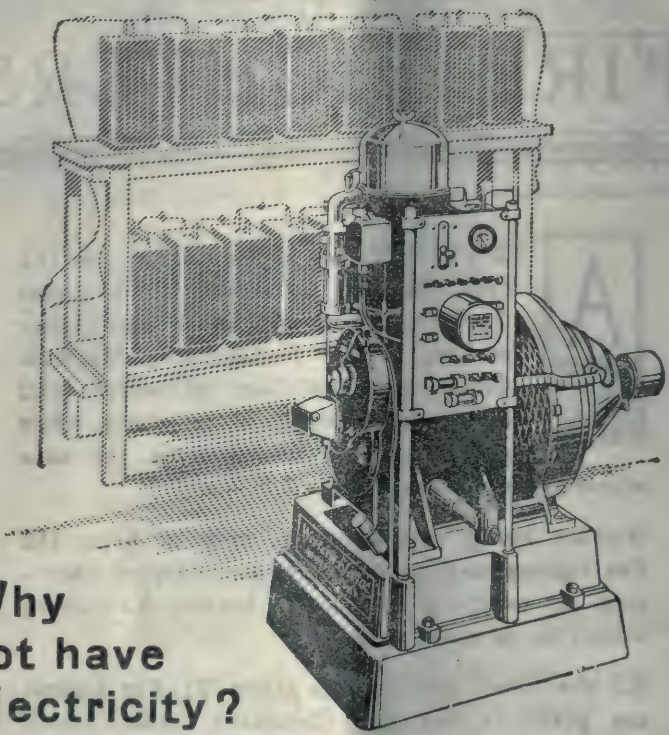

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Vol. XXXII. Part 4. APRIL 2, 1921.

THE
AGRICULTURAL GAZETTE
OF
NEW SOUTH WALES

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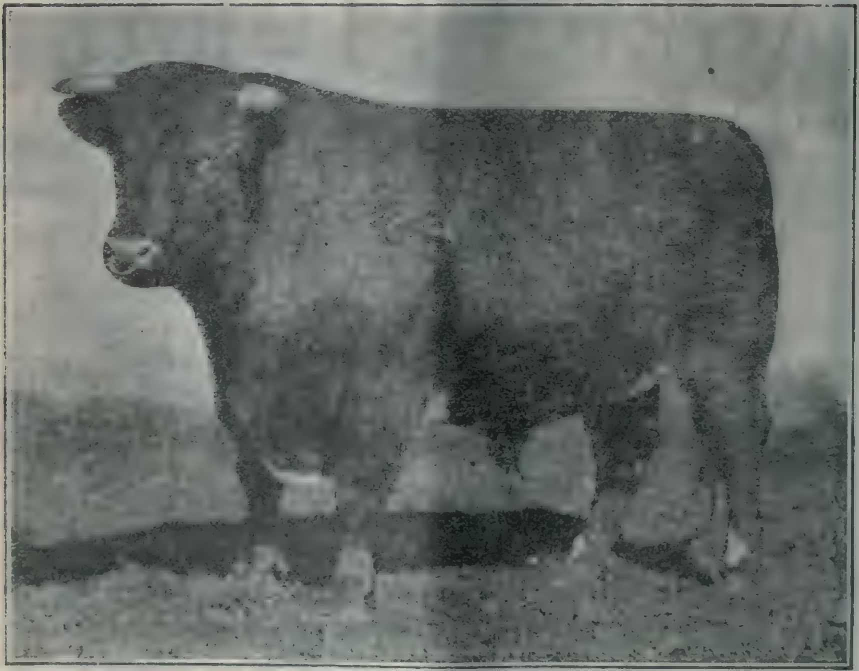

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2nd April, 1921.

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Calved—February 6th, 1917. Sire—"MALVOLIO" 11417. Dam—"PROMISE" Vol. XX, p. 408.

"PROMISE"—Dam of "Prometheus" averaged 8967 lbs. of milk for 7 years, and won the following prizes in Butter Tests:—2 First Prizes, 2 Gold Medals, 1 Second Prize, 1 Silver Medal, 1 Fourth Prize, and 5 Certificates of Merit. In Milk Prizes she won 1 First Prize, 2 Second H.C., R.N., H.C., H.C. at various Shows, 1909 to 1913.

"POST ORBIT"—Grand Dam of "Prometheus" won in Butter Tests 4 First Prizes 3 Gold Medals, 4 Second Prizes, and 2 Silver Medals, 3 Third Prizes and 2 Bronze Medals. In Milk Trials she won 4 First Prizes, 4 Second Prizes, R.H.C., H.C., at various Shows, 1906 to 1914. She yielded 93,994 lb. Milk in 9 years; average, 10,656 lb. per year. She also won 22 Prizes in classes, including 6 Firsts and 2 Blythwood Bowls. **His Sire's Dam** "Mrs. Viola" won E.J.C. Certificate of Merit in Butter Tests 1905, 1906, 1909, 1911; her average yield of Milk was 9,098 lb. per year for six years; she also won 6 Firsts and 1 Champion Prize, 1906 to 1911. **Sire's G. Dam** "Marigold XV" won in Butter Tests 3 Gold Medals and 3 First Prizes in Milking Trials, 1906 to 1910; her average milk was 9,448 lb per year for 12 years.

Full Particulars from—

The Manager, Retford Park, Bowral, N.S.W.

VOL. XXXII. PART 4. APRIL 2. 1921.

Agricultural Gazette of New South Wales.

Farmers' Experiment Plots.

WHEAT, OAT, AND BARLEY EXPERIMENTS, 1920.

Southern District.

G. C. SPARKS, Inspector of Agriculture.

THE 1920 series of wheat, oat, and barley experiments were located as under:—

R. H. Thackeray, "Woornack," Young.
E. W. L. Gordon, "Yanterilla," Tubbul.
H. M. Hall and Sons, "Studbrook," Cunningar.
Jennings Bros., "Urunga," Culcairn.
Eulenstein Bros., "Back Creek," Henty.
T. E. Kendall, "Mayburn," Ralvona.
D. and J. Gagie, "Spy Hill," West Wyalong.
Johns Bros. (R. B. Robb, Manager), "Wollongough," Ungarie.
H. W. Belling, "Bexley," Lockhart.
A. B. Dalgliesh, "Blair Athol," Berrigan.
Carew Bros., "Selbourne," Deniliquin.
D. Cheatley, Thyra (via Moama).

General Details.

Young.—Red loam; ploughed 4½ to 5 inches deep, August, 1919; harrowed in November; scarified late in March, 1920; cross-harrowed and scarified prior to seeding; sown 12th and 13th May; seed, 50 lb., superphosphate, 56 lb.

Tubbul.—Red loam; gravel patches; ploughed 4½ inches deep, September, 1919; spring-toothed in December and again in March, 1920; sown 6th May; seed, 51 lb., superphosphate, 56 lb.

Cunningar.—Red loam; cropped for wheat in 1919; ploughed 4 inches deep early in May; harrowed and sown 14th May; seed, 52 lb., superphosphate, 58 lb.

Culcairn.—Red loam; fourth crop; ploughed 4 inches deep in February, 1920; spring-toothed early in May; sown 11th May; seed, 57 lb., superphosphate, 60 lb.

Henty.—Red loam; old land; ploughed in October, 1919; spring-toothed mid-April, 1920; packed and spring-toothed prior to sowing on 10th May; seed, 48–50 lb., superphosphate, 58 lb.

Ralvona.—Grey alluvial loam; spelled in 1919, but cropped to wheat or oats without intermission for previous eleven years; ploughed 5 inches deep and spike rolled early in April, 1920; sown 5th May; seed, 60 lb., superphosphate, 55 lb.

West Wyalong.—Sandy red loam; clay patches; cropped for wheat in 1919, but fed off; disced in January, 1920; spring-toothed in March; late-sown land spring-toothed at the end of May; early sowing on 8th April; seed, 44 lb., superphosphate, 56 lb.; late sowing on 25th May; seed, 52 lb., superphosphate, 62 lb.

Ungarie.—Dark red loam; cropped for wheat in 1919; spring-toothed, 20th January; harrowed, 8th March; spring-toothed, 14th April; early sowing on 5th April; seed, 47 lb., superphosphate, 56 lb.; late sowing on 6th June; seed, 52 lb., superphosphate, 60 lb.

Lockhart.—Red clay loam; ploughed in July, 1919; harrowed in August and December; spring-toothed in April, 1920; sown on 3rd May; seed, 51 lb., superphosphate, 56 lb.

Berrigan.—Gray clay loam; disc ploughed in August, 1919; spring-toothed in January, 1920; disced and harrowed before sowing; sown on 18th May; seed, 50 lb., superphosphate, 48 lb.

Deniliquin.—Gray and black clay loam; ploughed August–September, 1919; rolled and harrowed mid-May; sown, 20th May; seed, 53 lb., superphosphate, 56 lb.

Thyra.—Gray clay loam; ploughed in August, 1919; spring-toothed and sown on 21st May; seed, 45 lb., superphosphate, 56 lb.

Season.

Following the dry season of 1919 droughty conditions prevailed throughout the summer and autumn of 1920. Rain fell during the earlier portion of this period, but mainly in heavy storms from which the loss by run-off was very great. As a direct result of the dry fallowing period the weed infestation of the ensuing crop was almost unavoidable, there being but little possibility of an early germination of weed seed. In April, the seed-beds were in a very dry condition; May was practically rainless, but the weather broke during the first days of June, and the winter became wet and mild. Spring was moist and cool, and harvest unusually late, which, of course, accounts for the comparatively high yields given by the late wheats, in spite of the fact that in most cases germination did not occur until early June.

Experiments located south of the Murrumbidgee suffered rather badly during the winter months from the heavy and continuous rains that occurred. At Henty the June rainfall was 664 points, and the soil was waterlogged for a period of six weeks. Similar conditions prevailed at Berrigan and Deniliquin, and while at Culcairn the experiment wintered well through being located upon undulating ground, the crop was badly cut about by a phenomenally heavy rain storm in November. Experiments north of the river made very robust growth throughout and promised very heavy yields, but the rain storms of early summer did a great amount of damage to them. In the southern experiments the yields were reduced by late spring wind-storms, consequently the yields of all experiments are lower than might have been anticipated following a survey in early November.

RAINFALL of the Fallow Period, 1919-20.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.
	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.
West Wyalong ...	...	...	...	...	...	...	38	10	141	124
Lockhart... ...	62	72	60	102	46	110	20	...	48	45
Ungarie	...	...	...	...	...	...	9	...	82	85
Berrigan	...	...	..	...	...	...	19	...	8	22
Deniliquin ...	23	33	68	72	98	3	17	37	8	25
Henty	...	..	...	...	26	236	158	...	16	90
Young	53	149	135	60	9	359	59	...	285	89

EFFECTIVE Rainfall during Growing Period.

	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Effective Rain.
	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.
West Wyalong ...	...	383	164	165	189	101	179	229	1,142
Lockhart	25	245	305	289	245	195	356	66	1,320
Ungarie	18	356	187	198	160	160	248	210	1,170
Berrigan	29	218	285	280	299	161	195	95	1,243
Deniliquin	37	153	131	407	204	183	116	60	1,093
Henty	31	664	288	298	191	239	191	50	1,839
Young	1	577	210	336	299	104	271	256	1,662

Variety Trials.

The results of the variety trials appear in the accompanying table. The performance of Canberra is a particularly encouraging one. It "stood" surprisingly well, was without comparison amongst early varieties, averaged slightly better in yield than Federation, and gave the highest individual yield of the series.

Federation withstood the wet conditions satisfactorily, maintaining a very healthy state throughout. Owing mainly, of course, to its habit of growth it bleached rather badly in many localities, but at the same time actual losses of grain were comparatively small.

Gresley No. 83 is a West Australian variety, tried for the first time in the farmers' experiment plots. It was top-yielder at West Wyalong, where it caused much favourable comment; but its comparative yield is discounted by its having been harvested along with Canberra and Florence in good weather. Gresley stripped extremely well, and at Lockhart was the only variety to be harvested without stoppage due to comb-choking. It is tall-strawed and early, and should be a good hay variety for dry districts.

Yandilla King averaged only 48 lb. less than Federation over twelve experiments. It is somewhat surprising that it should have headed the list in such an early district as Thyra, but the late spring rains provided conditions suitable to the development of the later varieties, in spite of the delayed germination

There is little need for detailed comment regarding the other varieties included in these trials, except that Penny was again successful at Lockhart and that the season was a particularly disastrous one for Currawa, which, owing to the delayed harvest, became an almost total loss in many districts owing to the rotting of its matured straw. Further, at Deniliquin it failed to stool, and at Young the head filled badly.

The failure of Hard Federation at Culcairn was due to take-all—practically the only appearance of disease in these experiments.

VARIETY Trials.

	Young.	Tubbul.	Cunningar.	Culcairn.	Henty.	Ralvona	*West Wyalong.	Ungarie.	Lockhart.	Berrigan.	Deniliquin.	Thyra.
Bomen	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.
Bunyip	..	15 20	..	20 57	15 19	21 13	..	18 49	15 59	22 59	16 33	27 25
Canberra	..	..	..	..	..	..	..	20 15	..	..	..	..
Cedar	36 41	25 21	27 46	23 28	..	18 12	30 5	26 47	15 59	21 29	20 33	28 34
Comeback	..	..	..	..	..	..	21 40	..	..	..	..	..
Currawa	..	..	..	..	..	..	..	16 0	..	..	..	..
Federation	28 49	17 33	16 56	19 54	..	17 39	19 44	20 20	9 17	15 45	10 51	25 54
Firbank	31 39	27 0	29 26	29 20	12 56	25 43	26 20	22 4	23 40	17 19	17 30	26 15
Florence	..	11 37	..	..	..	..	..	21 8	..	..	..	..
Golden Drop.. ..	22 31	..	..	..	..	..	25 48	23 57	..	..	..	..
Gresley 83	..	..	..	..	..	..	..	24 4	..	..	..	..
Hard Federation ..	..	..	..	22 9	16 44	23 16	35 53	..	20 12	..	16 44	..
Improved Steinwedel	32 23	18 1	22 30	11 49	11 33	25 12	25 9	14 39	19 1	20 23	18 4	25 59
Jade	..	..	..	..	..	..	..	15 17	11 37	18 40	..	..
Marquis	..	..	..	..	..	..	23 28	..	..	..	.	...
Marshall's No. 3 ..	..	..	..	..	..	..	26 7	..	..	..	..	..
Penny	..	19 59	20 50	..	12 23	20 28	..	21 48	14 28	16 25	..	..
Thew	..	17 24	20 28	26 59	15 10	20 42	..	..	24 20	..	14 57	..
Warden	28 43	..	..	..	12 9	..	..	17 4	..	..	19 24	..
Yandilla King ..	..	..	..	22 32	16 55	..	..	..	16 3	..	..	..
Zealand	31 59	25 23	25 16	22 34	13 31	..	32 12	16 12	23 25	20 44	14 48	28 45
	27 33	..	13 40	..	8 12	..	..	..	..	..	..	..

*NOTE.—At this centre the varieties Canberra, Florence, and Gresley 83 were harvested before the heavy rain of late November and December.

MANURIAL Trials.

—	Young.	Tubbul.	Cunningar.	Culcairn.	Henty.	Ralvona.	West Wyalong.	Ungarie.	Lockhart.	Berrigan.	Deniliquin.	Thyra.
	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.	b. lb.
Superphosphate, 28 lb. per acre ..	28 36	25 13	30 1	14 33	14 4	24 40	24 59	23 23	17 0	17 3	15 52	23 11
Superphosphate, 56 lb. per acre ..	31 39	27 0	29 26	17 27	12 56	25 43	26 20	22 4	23 40	17 20	17 30	26 15
Superphosphate, 84 lb. per acre ..	28 28	27 16	24 5	15 12	14 55	24 5	25 40	23 12	20 53	17 0	14 12	26 13
Superphosphate, 112 lb. per acre	..	..	..	..	..	..	..	..	..	17 40	..	..
Basic Superphosphate, 56 lb. per acre	27 27	..	..	15 27	..	..	..	..	24 16	..	..	..
P7, 84 lb. per acre.	28 52	..	..	..	..	26 3	..	..	..	..	..	..
No manure.. ..	24 12	16 19	26 57	14 33	10 29	23 23	21 29	20 20	16 17	15 38	13 21	19 23

The mixture P7 consists of equal parts of superphosphate and bonedust.

The Manurial Trials.

Manurial trials were conducted at each centre, and attempts were made to compare what may be regarded as the standard rate of application (56 lb. of superphosphate per acre) with a heavier manuring (84 lb.) and a lighter (28 lb.), and also with no manure. The results indicate that the standard proved the most profitable rate, averaging 4 bushels 20 lb. more than the unmanured, and outyielding the 28 lb. and 84 lb. dressings by 1 bushel 34 lb. and 1 bushel 20 lb. respectively—a result uniform with the experience of previous seasons.

Additional plots of superphosphate 112 lb., basic superphosphate 56 lb., and P7 84 lb. were included in several experiments with the following results :—

Superphosphate 112 lb.—At Berrigan the use of 112 lb. superphosphate increased the yield over 56 lb. by only ½ bushel per acre.

Basic superphosphate 56 lb.—At Ralvona, Culcairn, and Lockhart basic superphosphate gave an average yield of 1 bushel 52 lb less than the corresponding plots of 56 lb. superphosphate.

P7 Mixture 84 lb.—At Young and Ralvona P7 averaged 1 bushel 14 lb. less than the adjoining plots of 56 lb. superphosphate.

It would appear that the application of 56 lb. of superphosphate must still stand as the most profitable.

Early *v.* Late Sowing.

Tests of early *v.* late sowing were included at West Wyalong and Ungarie. The results were as follows :—

West Wyalong.		Ungarie.	
Early (8.4.20) ...	26 bushels 20 lb.	Early (25.4.20)...	22 bushels 4 lb.
Late (25.5.20)...	26 bushels 23 lb.	Late (6.6.20) ...	19 bushels 40 lb.

The season was favourable to late sowings, and the early sowings, because of their slightly more robust growth, were storm-damaged to a relatively greater degree.

Graded *v.* Ungraded Seed.

Graded seed was compared with ungraded at Culcairn and Tubbul with the following results :—

	Culcairn.	Tubbul.
Graded ...	17 bushels 27 lb.	27 bushels
Ungraded ...	19 bushels 51 lb.	20 bushels 41 lbs.

At Tubbul the results emphatically favour graded seed. At Culcairn the graded plot was damaged by storm-water, but it can be said that the sowing of ungraded seed has nothing to recommend it; quite apart from the importance of the removal of possible weed seeds, ungraded seed contains a large amount of grain valuable as feed but useless as seed, and the saving and utilisation of this material is sound practice.

Rates of Seeding.

Tests to determine the most profitable rate of seeding were carried out at five centres, as shown below, 45 lb. of seed per acre being taken as the standard, and 33 lb. and 57 lb. as the rates for light and heavy sowing respectively. Additional plots of 63 lb. and 70 lb. per acre were included at three centres. It is, of course, impossible to get absolute uniformity in rate of sowing owing to the variation in drills, but in every case the margin was not greater than from 1½ lb. to 2 lb. of seed per acre.

Except at Tubbul the results were consistently in favour of heavy seeding. This was probably due to the late germination of all sowings referred to earlier.

SEEDING TESTS.

Seed.	Ungarie.		Thyra.		Berrigan.		Ralvona.		Tubbul.	
lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
33	22	35	......		......		......		20	43
45	22	4	26	15	15	18	......		27	—
57	23	4	27	42	......		25	43	23	59
63	......		......		18	20	......		......	
70	......		......		......		25	20	......	

Acclimatized v. Unacclimatized Seed.

A test of local Federation against seed of the same variety direct from Wagga Experiment Farm was carried out at Deniliquin. The result was:—

Unacclimatized seed... ...	17 bus. 30 lb.
Acclimatized (local) seed ...	15 ,, 12 lb.

Oat Experiments.

Variety trials of oats were planted at West Wyalong, Lockhart, Cunningar, Culcairn, and Young, but owing to the very boisterous harvest weather the plots were so damaged that returns are available only from West Wyalong, and even there quite 40 per cent. of the grain was beyond recovery. The yields were:—

Guyra	26 bus. 35 lb.
Sunrise	26 ,, 3 ,,

The preparation of the soil was identical with that of the wheat plots. Guyra was sown on 8th April, 40 lb. of seed being used, and Sunrise on 25th May 55 lb. of seed, 56 lb. superphosphate being used with both.

Barley Experiments.

Barley variety trials were included at Young and Henty. At Young the plots were totally destroyed by heavy falls of rain late in November and early in December, the heads being completely stripped from the stalks.

At Henty the yields were very low, the plots never recovering from the saturation of June and July. In comparison with the yields of the wheat section at Henty, the barleys failed badly, reversing the 1919 results when the barleys heavily outyielded the wheats.

The yields were:—

Goldthorpe	11 bus. 22 lb.
Golden Grain ...	9 ,, 49 ,,
Kinver	9 ,, 19 ,,

The Elimination of the Unfit.

J. T. PRIDHAM, Plant Breeder.

It is gratifying to note that the Council of the Royal Agricultural Society is now considering a movement among farmers that has for its object the production of pedigree seed. It is only fair to state that this process has been going on for many years at the principal Departmental farms in the wheat-growing districts as part of the regular routine—the Manager of Wagga Experiment Farm, for instance, would almost as soon think of allowing a cross-bred bull in his Jersey herd as he would think of sowing a paddock with Hard Federation wheat obtained from a dealer or neighbouring farmer. The grain used to produce seed wheat for sale is obtained from stud or pedigree plots sown from single selected plants of the variety. We regard the wheat crop as a population, and the variation everywhere seen in nature enables us to earmark certain individuals. These, in the main, breed true and reproduce themselves faithfully. It does not take long to raise, by thin sowing, a strain which will yield bushels more to the acre than the common run of seed from which the dyspeptics and consumptives have not been eliminated. This rejuvenating and revitalising process is more essential than mechanical grading (important in its place), and has to be maintained year after year or else, with clockwork regularity, the quality of production will drop back to the dead level of mediocrity. Seed wheat or oats of this stamp is absurdly cheap at the price sold on Government farms. What the Department advises is that farmers should buy a bushel or a bag of the improved seed every year and thus keep their seed up to the standard. Of course, a farmer could carry out the system on his own property; but for those who have not the time or inclination the best way is to buy a small lot regularly from the nearest experiment farm. When Departmental officers see grain of imported varieties, inferior to our own, sold for four times their value simply because they have been advertised and because the public like a novelty, we may be pardoned if we cry our own wares, even though the sound is unusual.

This paper, however, is to awaken a new interest in the minds of growers for crops that are sown in a wholesale way or in bulk, as wheat, oats, potatoes and summer fodders. If such crops were sown thinly—say, to single plants as in an orchard—we would long ago have been alive to the necessity of cutting out the unproductive individuals. An old potato grower remarked that he should have started rejecting the poor hills in his field long ago, instead of mixing the tubers when dug and using the small ones for sowing irrespective of their family history.

The cry to-day is for increased production, and it can be brought about by the use of more vigorous seed without an extra rod of ground being brought under the plough. The farmer has a most powerful means at his disposal in selection—a means which statesmen and eugenic reformers would like to use with the human subject, did any parliament pass such heroic measures. A census taken recently in England of drafted men for the first eight months of 1918, shows that of 2,000,000 men examined only 36 or 37 per cent. were up to a normal standard of health, strength and fitness. The men medically examined were a fair sample of the nation; and as the result of the prevailing industrial conditions, overcrowding, and a strenuous life with too little nourishing food, approximately two-thirds of the population were unfit to maintain the battle of life with full vigour.

A word or two in regard to the method of procedure with plants. A farmer who saves a patch of crop for seed which has grown more vigorously than the rest of the paddock is only on the first step of the ladder to improvement. The well-grown patch of crop may have fewer wild oats, and the grain may even be plumper than the rest of his crop, but the improvement is merely due to a little extra soil moisture or fertiliser, to better cultivation or richer soil. Such seed will not produce a uniformly vigorous crop next year, because it still consists of a mixed population. We need to "line up" plants singly for inspection before we are in a position to see what sort of individuals we have for seed mothers; it only needs to be done once to convince the most casual farmer of the existence of many weaklings and sick plants in the average crop. Cut these out, and we are making strides towards higher production.

Crop plants can be bred on the same principle as animals, and their rate of increase is infinitely greater, besides being more subject to control. We have a variety of barley named Cowra No. 21, which is very like Pryor's barley, and which we propose calling Pryor's Improved. It has yielded better than Pryor's, because of the course of selection that it has been through and because the material in the first place was good. No amount of selection will improve a naturally unproductive variety among self-fertilised plants. On the other hand, just as in the animal world, in any crop the more careful and thorough the culling process, the higher will be the yields.

THE WATER REQUIREMENTS OF WHEAT VARIETIES.

AN attempt was made in the state of Oregon, U.S.A., in 1919, to determine whether the apparently greater yielding capacity of Hard Federation as compared with Early Baart (one of the best known varieties locally) was due to a lower water requirement. As a result of a transpiration experiment, it was found that while Hard Federation produced a crop of grain on 1,551 lb. water, Early Baart required 2,422 lb. Relatively to the wheat of other countries Australian wheats have a very low water requirement—a character no doubt connected with the popularity of wheat as a crop in this country.

Field Experiments with Fodders.

COWRA EXPERIMENT FARM.

C. McCAULEY, Assistant Experimentalist.

Winter Fodder Trials, 1920.

[The Experiments Supervision Committee, under whose control these experiments are being conducted, wish to draw the attention of farmers to the fact that the results are only those of one year's trial, and that final conclusions cannot yet be drawn.]

IT must be borne in mind in relation to the results given hereunder that several considerations besides that of yield should guide one in the selection of a winter fodder. Since the crop is required in the late winter or early spring, earliness of maturity is also essential. For this reason a variety like Hard Federation may be preferable to Zealand. The former gives less fodder but is ready to cut nearly a month earlier—a fact which outweighs the consideration of a difference of only 14 cwt. in a yield of 6 tons 10 cwt.

Again, quality of fodder, and the purpose for which it is required, must be considered. For instance, although in this test the swedes have given a very low yield, their feeding value ton for ton for sheep and cattle is higher than that of the other fodders—how much higher under Cowra conditions is a matter which must be left to a possible feeding experiment in the future. There are also great variations in the fodders in respect to palatability, and these call for consideration too.

A crop may be intended for use during the late winter, but circumstances occasionally arise (for instance, abundance of grass at this season) rendering it more profitable to allow, if possible, the crop to mature either for hay or grain, and to turn stock on to the natural pastures. This point must not be lost sight of in choosing a fodder which, other things being equal, may, if necessary, serve the second purpose. Rape, for example, although a useful crop in a rotation with wheat, has not this advantage.

The previous crop on the land used for this experiment was rape, sown in February, 1919. The land was ploughed on 2nd and 13th January, 1920, spring-tooth cultivated between 12th and 16th February, and skim ploughed between 10th and 20th March. Sowing took place on 25th and 26th March, superphosphate being applied at the rate of 60 lb. per acre. At the time of sowing, the ground was very dry, and did not contain sufficient moisture to cause germination. Germination took place on 24th April, as the result of rain falling between 12th and 14th April.

Owing to the hot, dry weather during May the plants made very little growth until June, but during that month and those following, good rains fell, and as a result the plants grew vigorously. Rye, Sunrise oats, and Cape barley made the best growth during the winter months; rape and swede turnips germinated too late to give the best results. Owing to the impossibility of obtaining Skinless barley seed, Canada field peas were sown in the vacant plot on 11th April; they were sown too late, however, and did not attain sufficient growth to harvest. All plots were free from disease.

The rape, swede turnips, and Canada field peas were cultivated on 25th June and 23rd August. Rape and rye were the only varieties which made sufficient second growth to harvest. All plots were harvested at their maximum period of development and weighed immediately after cutting. The area of the plots was a quarter-acre.

The rainfall during the growing period was as follows:—March, 52 points; April, 170 points; May, 6 points; June, 568 points; July, 262 points; August, 324 points; September, 234 points; October, 304 points; November, 155 points. Total, 2,075 points. During January, February, and March (up to the date of sowing) 281 points fell.

The yields were as follows:—

Varieties in order of merit (based on percentage yield).	Rate of seed per acre.	Yield per acre (based on percentage).			
	lb.	t.	c.	q.	lb.
Cape barley	36	8	16	1	2
Sunrise oats (check)	40	8	0	2	15
Rye	30	7	7	3	25
Algerian oats	40	7	1	0	22
Zealand wheat	42	6	10	0	17
Rape	5	5	18	2	4
Hard Federation wheat ...	42	5	16	3	25
*Swede turnips	5	2	13	2	22

* The tops of the swedes were cut and weighed, and all roots worth digging were also dug up and weighed.

ANALYSES OF LUCERNE AND TREE-LUCERNE.

THE following table shows the compositions of "tree" lucerne (tagasaste) and ordinary lucerne. It will be observed they are very similar:—

	Ordinary Lucerne.	Tree Lucerne.
	Per cent.	Per cent.
Water	73·5	75·0
Albumenoids	6·6	7·4
Ether extracts	0·4	0·1
Ash	2·3	2·4
Fibre	6·2	6·0
Carbohydrates	11·0	9·1
	100	100
Albumenoid ratio ...	1 to 1·8	1 to 1·3
Nutritive value	18·5	17·

—F. B. GUTHRIE.

Farmers' Experiment Plots.

HAY TRIALS, 1920.

Murrumbidgee Irrigation Areas.

A. N. SHEPHERD, Assistant Inspector of Agriculture.

HAY trials with oats and wheat on the above areas were carried out during 1920 season on the properties mentioned below. Although the crops were grown on irrigable land, owing to the exceptionally good rainfall during the growing season it was only found necessary to irrigate in one instance.

L. R. Brown, Farm 142, Yanco.
E. H. Ronfeldt, Farm 797, Whitton.
A. E. R. Tiffen, Farm 319, Leeton.
J. M. Seton, Farm 351, Leeton.

The Season.

Owing to the exceptionally favourable season, it can hardly be said that the experiments were carried out under irrigation methods; in fact, owing to excessive rains, the yields were decreased on some of the heavier land by rain water lodging on the land and scalding the crop. It was noticeable that the later sown crops gave the heavier returns. This was due chiefly to the good start and rapid growth made by them following the winter rains, and the absence of any check. In the case of the earlier sown crops, while the land was in excellent condition at sowing time and a good germination resulted, the hot, dry weather that ensued quickly dried out the soil and the crops suffered a set-back, for it is not always advisable to irrigate before good growth has been made. Doubtless if only a light fall of rain had occurred earlier the first sown crops would have given heavier yields.

In such a season as that just experienced—very dry at sowing time followed by good rains six weeks to two months later—too much care cannot be given to the preparation of the seed-bed, as in the heavier soils it may mean the difference between success and failure; for even with irrigation water available, unless the land be well ploughed and cultivated at the proper time after irrigating, it dries out to such an extent that very patchy germination may result.

The rainfall registrations were as follows:—April (after sowing), nil; May, 31 points; June, 213 points; July, 276 points; August, 261 points; September, 286 points; October, 166 points; November (to 18th), 37 points; total, 1,270 points.

The Plots.

Farm 142.—Soil rather heavy; previous crop oats (fertilised with 56 lb. superphosphate); ploughed in February, well work down, and irrigated at the end of March previous to sowing. Sown at the rate of 1 bushel per acre. Variety trial fertilised with 56 lb. superphosphate per acre.

In the manurial trial the plot fertilised with M5 was reduced in yield owing to the effects of the heavy rainfall, the water scalding portion of the crop.

The early maturing varieties Firbank and Canberra were cut on 18th October and the others twelve days later.

Farm 797.—The soil here was rather uneven, the oats being grown in crab-holey country; this class of land seems suitable for the growing of oats, some very heavy crops being obtained on the area this season. Previous crop, peas. Seed sown on well-prepared land, previously irrigated on 17th and 19th April; germination good, but owing to the land drying out it was found necessary to irrigate the crop during the first week in May. Crop made rapid growth after June rains, but portions subsequently showed effects of too much water. Owing to the attacks of rust, Guyra and Sunrise oats were cut earlier than otherwise they should have been; both these oats grew very tall, some of the Sunrise attaining a height of over 8 feet. A little of both varieties lodged, but this chiefly occurred on the "puffs"—rises in the crab-holey country, which, although they have been graded off during the preparation of the land, rise again after rain or after being watered, giving the land the appearance of having puffed up. The growth on these "puffs" is invariably rank and luxuriant. The Algerian oats and the wheat were cut on 4th November.

Farm 319.—Better class soil of the area; land well fallowed; previous crop millets (fed off with stock); same rates of seeding as in other plots, with ½ cwt. superphosphate. Sown 11th and 12th May; came away very quickly and received the full benefit of the first rains in June.

The Sunrise oats stooled much better than is usually the case with this variety; the oats grew over 7 feet high and the wheat attained a height of 6 feet. The early maturing wheats were harvested on 19th October and the others in the first week of November. The crops on this plot were not so badly affected with rust as those in the other trials.

Farm 351.—Sown 4th and 5th May on red clay loam; previous crop, oats (unmanured). All sections germinated well and good growth followed. Early varieties cut 18th October, and late maturing varieties 3rd November.

General.

Hard Federation was sown in these trials for the first time and gave very promising returns, although in some instances the crop was badly affected with rust. Bomen does not appear a suitable variety for growing under irrigation methods, as it very quickly shows bad signs if there is excessive water, and without plenty of moisture the growth is rather short. Canberra is very easily distinguished by its light-coloured straw and upright growth of flag. A big fault appears to be the weakness of the straw, which bends over and then makes an upright growth again; this was noticeable throughout the plots. The hay was fine in the straw.

Yandilla King gave very good returns, and is one of the best wheats for the areas. Zealand upheld its former reputation for suitability for the areas, giving good heavy returns of fine quality hay with good ears, fairly free from flag and little attacked by rust. It may be said this wheat is first choice as a hay wheat under irrigation. Even if this variety should be sown late and the season turns dry in early spring one watering will assure a good yield of hay.

Of the varieties of oats Algerian appears to be the most suitable for hay purposes. It is not as badly affected by rust as the other varieties, is a better stooler, and stronger and finer in the straw, although it may be a little later in maturing.

RESULTS of Variety Trials.

Variety.	Farm 142.				Farm 797.				Farm 319				Farm 351.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb	t.	c.	q.	lb.
Yandilla King	3	1	3	24	2	17	0	7		....				....		
Marshall's No. 3 ...	2	18	0	8	2	16	3	0	3	17	1	26	2	17	1	16
Hard Federation ...	2	12	3	0	2	15	1	7		....			2	11	0	0
Canberra	2	12	0	14	2	13	2	7	3	15	3	17		....		
Firbank	2	10	1	22	2	10	2	14	3	16	2	23		....		
Bomen	2	8	3	14	2	11	3	0		....			2	5	1	2
Zealand		....				....			4	1	0	12	3	2	2	0
Florence		....				....			3	14	1	26	2	8	3	6
Algerian Oats		....			2	19	3	0	3	18	0	12	2	2	1	0
Guyra		....			2	19	0	0	3	19	1	20	1	19	0	0
Sunrise		....			2	16	0	7	3	13	2	17	1	18	3	0
Ruakura		....				....				....			1	17	1	7

RESULTS of Fertiliser Trial (Variety, Yandilla King).

Fertiliser per Acre.	Farm 142.				Farm 797.				Farm 351.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
½ cwt. P8	3	3	0	16	2	17	3	0	2	19	0	3
½ cwt. P7	2	19	2	24	2	16	1	7	2	15	1	21
½ cwt. M5	2	18	2	13	2	16	0	0	2	14	1	10
½ cwt. Superphosphate ...	3	1	3	24	2	17	0	7	2	12	2	18
½ cwt. Basic Superphosphate...		....				....			2	8	3	27
No manure		....				....			2	4	3	5

P8 consists of equal quantities superphosphate and blood and bone; P7 of equal quantities of superphosphate and bonedust; M5 of 2 parts superphosphate and 1 part sulphate of ammonia.

WHEAT VARIETIES UNDER TRIAL.

AT Condobolin Experiment Farm during the past season the wheat Billy Hughes yielded at the rate of 27 bushels per acre, Cowra No. 6 at 30 bushels, Red Wings at 29 bushels, and Clarendon 26 bushels. In all cases the seed was sown in April, 1920, at 45 lb. per acre, and with 45 lb. superphosphate, and though partial germination took place after showers in April and May, a good start was given the planting by rain in June.—E. W. KENNEDY, Manager, Condobolin Experiment Farm.

Improved Transport in Dairying Districts.

A Quick and Cheap Service.

L. T. MacINNES, Dairy Expert.

The Railway Commissioners' response to representations put before them by the Department of Agriculture (Dairy Branch) in connection with the transport of cream daily from farm to factory along the Grafton-Lismore railway has done a great deal towards bettering the condition of the cream delivered for manufacture, and therefore for the quality of the butter produced by the factories concerned; but it has also opened up possibilities for other districts.

This mode of transport has proved successful in the present trial, and with better and more powerful motors an improved service is confidently looked for. On many of our coastal rivers there are large areas of fairly level land where dairying is carried out extensively; this also applies to such closely settled localities as the Yanco Irrigation Area, Leeton. In all these districts one of the chief drawbacks to the manufacture of a choicest grade butter or cheese is the transport problem—the delay in getting milk or cream quickly and cheaply from the dairy farm to the factory. The idea presents itself that by laying down rails on the roadsides and establishing a road motor service, this difficulty could be got over at less expense, both in laying down the track and in maintenance, than would be the case if existing roads were macadamised and kept in good repair for the use of ordinary motor lorries. Dairy produce (and fruit also) suffers rapid deterioration by rough haulage, while any lengthy delay and exposure to the heat in transit to the factory, especially during the summer months when the dairying and fruit seasons are at their height, cause great losses to the producers.

The Rail-motor on the Lismore-Grafton Railway Line.

In view of the possibilities, the following article on rail-motor services is especially interesting and opportune. It is hoped that there will be a rapid extension of the system. It might even receive favourable consideration by the local authorities controlling the main roadways of the State. Undoubtedly one of the main factors in developing any country is the provision of good roadways, to enable what is produced to be brought to the centre where it is to be sold or handled, not only quickly but cheaply, and with the least damage possible. The utilisation of motor traction on rails seems to meet these requirements.

THE POSSIBILITIES OF THE RAIL-MOTOR SERVICE.

O. C. BALLHAUSEN, Dairy Instructor.

About eighteen months ago a rail-motor carriage was placed on the Grafton-Lismore line to serve the requirements of passengers on that section of railway on days on which the usual trains did not run. This portion of the line has never been a paying one, and to somewhat reduce the annual loss the Commissioners had been compelled to withdraw the usual service on three days of each week. It was to meet the demand for a return to a daily passenger and cream delivery service which immediately followed the curtailment in traffic that the experiment with a rail-motor capable of carrying passenger and light goods traffic was made. The innovation has proved highly successful. For a considerable time only passengers and light parcels were carried, but for the past six months a special louvred truck for the carriage of cream and heavy parcels has also been in use.

The reduction of the train service inflicted a heavy handicap on dairy-farmers on this route, as it meant that cream would have to be held and cared for on the farms for longer periods. To retard deterioration during the sultry summer weather is difficult enough at any time, but when the period over which this care had to be exercised was extended by the withdrawal of the trains, the attention necessary was still greater. The advent of the rail-motor means a fast passenger, cream, and parcel service for the district, and should mean for the Railway Commissioners a profitable service.

As already mentioned, the venture was purely an experiment. Queensland and Tasmania had already attempted something of the kind, but the New South Wales Commissioners went further, and provided probably the best rail-motor of its kind in Australia to-day. The basis of the car was originally a 5-ton lorry of 40 horse-power. To convert it into a carriage, the chassis was lengthened and strengthened. Large flanged wheels were substituted for the ordinary back wheels, and a four-wheel bogie, similar to a locomotive bogie, for the front wheels. A number of other necessary alterations, which need not be entered into here, were also made. The accommodation is very comfortable; the carriage is gas-lighted and seats from thirty-five to forty passengers. So popular did the car become owing to the degree in which it reduced the time occupied on the journey, that it was quickly seen that the accommodation was insufficient, and the Commissioners are now building cars of 150 horse-power at their Eveleigh workshops.

The efficiency and low cost of upkeep of the petrol-driven rail car make it probable that many centres that would not have warranted the construction of lines suitable for steam traffic for many years will now be connected by light rails with main lines. To illustrate the possibilities in this direction it should be borne in mind that the engine in "Rail Motor No. 1" is only a four-cylinder 40 horse-power, and the chassis was originally intended to carry 5 tons. The carriage portion of the rail-motor, inclusive of chassis, body, &c., weighs over 8 tons, and passengers and luggage would weigh 2½ to 3 tons. In addition to this it hauls a van loaded weighing slightly over 6½ tons. The fact that the car runs on a smooth rail surface and is provided with gears to meet the variations in grades makes all this possible.

With a sufficiently powerful car, it is possible to draw several trailers or vans. This type of service should be particularly suitable for the smaller coastal centres, situated some distance up branch streams (Nimbin, for instance), and devoted primarily to dairy produce and fruit-growing. Produce from dairying centres is principally of a more or less concentrated type, and, whilst fairly heavy, it has not the bulkiness of produce from, say, our wheat and wool growing areas, where numerous rail vehicles are required. Moreover, the settlement in our dairying centres is fairly close, ensuring a fairly regular passenger traffic to the more important towns. Only very light lines, bridges, and culverts would be necessary, curves could be much shorter, and probably fairly steep grades could be more easily met by means of the variable gears—gears that a steam locomotive lacks. In many places the lines might follow the routes of existing roads—which are often not roads at all—and relieve them of much heavy traffic.

In view of the forecast by certain journals devoted to motoring, that the effort was doomed to failure owing to the antipathy of the "old school" locomotive engineers, a pleasing feature of the inauguration of this class of transport on the railway is the sustained interest shown by all railway officials. It is fully realised by the officials that there are big possibilities in its development, as the Commissioners report on the nine months' working illustrates. The report says:—

"A motor train service, given by a converted 5-ton motor lorry, petrol-driven, was put into operation over the section Grafton-Lismore in October. 1919, and has proved successful, although the type of motor is not the most desirable for the purpose. During the year (nine months) a mileage of 16,346 miles was run, and 7,157 passengers were carried. The earnings amounted to £2,377 and the working expenses to £922 or 38·79 per cent. of the earnings.

"In view of the satisfactory results obtained, the Commissioners propose to construct more motor vehicles as rapidly as suitable motors and other material can be obtained, and to extend the service for passenger transport over other branch lines in the State."

The Production of Better Seed in other Countries.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

THE improvement of cultivated plants and the commercial production of seed from such improved "lines" of plants have been for some time vigorously undertaken by European countries, and also by America. The two nations most outstanding in this respect are Sweden and Canada. The methods adopted in Sweden have served as a model for other nations, and there follows in brief an account of the methods employed. For a large part of the information I am indebted to Mr. W. R. Birks, B.Sc. (Agr.), an officer of the Department, who visited the country after his war service, and subsequently compiled a report of his investigations.

The Swedish Institute at Svalof, for the improvement of cultivated plants, has been in existence for over thirty years. In close co-operation with the Institute is the General Swedish Seed Company, a private commercial body for growing, treating, and selling farm seeds in bulk, such seeds being the direct result of the work carried out by the institute. The latter is subsidised by the Government, and these funds, together with those obtained from the seed company for the sale of the seed, and from other sources, are sufficient for the employment of the most expert officers in plant-breeding work.

Very little progress was made at first, owing to the fact that the work was carried out on the lines of Darwin's theory of selection, which is based on the hypothesis that a systematic and continuous selection of plants characterised by certain traits should lead to the creation of a new form, possessing the desired traits as hereditary characteristics. The work was, in consequence, more or less haphazard, as, instead of the plant being treated as a distinct unit, thousands of plants were examined for the variations in the particular organs, such as grain, stalk, &c.

The investigations of De Vries, in the latter end of the 19th century, showed that plants could break away suddenly and completely from the type, such plants being called mutations. This principle was adopted by Dr. Nilsson Ehle at the Svalof Institute; and by treating the plant as an individual unit more rapid progress was at once made. Starting with thirty different plants culled from a wheat field in 1890, in 1893 the number was increased to 2,000, each plant possessing a definite characteristic. The seed from such individual plants is sown, and certain distinct types are soon 'fixed," *i.e.*, remain constant. The superior types are extended as quickly as possible, in order to place the seed on the market. The seed from the bulk plots is placed under the control of the General Swedish Seed Company, which in turn extends its operations on its own land, and enters into contracts with private growers. The resulting progeny of the seed is never lost sight of, as the institute's experts continually supervise the seed farms, and see that the strains remain true and superior in type.

Improvement work is also carried out with beets, potatoes, clovers, and grasses. To form an idea of the vast proportions to which this improvement work has grown it might be mentioned that at present over 4,000 different types of cereals alone are grown on the farm, and there are in existence altogether 10,000 plots. A good deal of work is also carried out in the improvement of plants by means of crossing. It is recognised, however, that selection is the fundamental factor in all this work, as the required superior types must be selected and fixed before crossing is effected.

"Nilsson Ehle," states Mr. Birks, "might be well termed the Farrer of Sweden. As the result of his work, combined however with the extraordinary richness of the soil, cereal yields up to 90 bushels per acre are obtained. In one of the most successful wheats the original crossing was made on ten or fifteen mother plants, producing 100 to 200 developed kernels. The progeny of these in the F_2 generation should be, say, 40,000 plants. Of these the winter culls 50 per cent.; for liability to rust and weakness of straw 75 per cent. of the remainder are discarded before harvest; this leaves 4,000 or 5,000 plants. From the results of stringent examination, 100 to 200 of the best plants are selected to form families in the F_3 generation; twenty to thirty of the best of these again go into small plots in the following year, and in the fifth generation some half dozen are selected for the large comparative trials. In the meantime stringent 'culling' is effected within these lines, and fresh selections are made for the re-developing of pedigrees as from the F_2 in the first place. As the result of these methods one of their successful crosses, viz., Iron wheat, has an increase in yield of 45 to 50 per cent. over the old native wheats of Sweden."

Seed Contracts with Growers.

As already pointed out, the General Swedish Seed Company buys all the improved bulk seed from the institute for further commercial production. It extends further production on its own land, and also enters into contracts with private growers. The terms of such a contract are, briefly, as follows:—

1. The grower undertakes to grow the seed for the Swedish General Seed Company.
2. The grower is bound to deliver to the seed company without remuneration the same weight quantity as received, with an addition of 25 per cent.
3. The grower is bound to deliver the entire balance of the crop to the seed company for a fixed remuneration.
4. Should the company be unable to accept the average quality sample which the grower is bound to send to the company, then the grower's obligation shall cease.

5. The grower shall deliver the crop in clean condition.
6. The grower binds himself to allow the seed company's representative to inspect at any time, and at the company's expense, the growing crop at any place.
7. Should the crop not be approved of as seed goods by the seed company on account of faulty harvesting, ill smell, low germination, mixing with foreign sorts, diseases, or other causes, and providing this is caused in any way by neglect or improper handling by the grower, he shall be bound, if so claimed, to pay for the seed he received at the price quoted for the goods in question in the year's catalogue.
8. Should the goods delivered be found not up to sample, or should they show upon closer examination that they do not reach the standard mark on the measure, and the goods so be in any case unfit for seed, they will then be valued according to the mutual agreement of the grower and the seed company.

Progress in Canada.

It seems practically certain that the Swedish method was a model for Canada. A Canadian Seed Growers' Association was founded in 1900, its functions being an extension of the Agricultural Department's activities. It is realised that the Department is not in a position to control the multiplication and distribution of the improved sorts in a large way, and to the best advantage among individual farmers, and that the work is best done (as in Sweden) by a separate and independent organisation. The association appoints provincial officers for the field inspections, and its own officers for the final inspection in the sack.

The method adopted by this association is as follows:—

1. Membership of the association is open and free to any *bonâ fide* farmer who has shown himself capable of producing improved pure seed.
2. The farmer who undertakes to grow pure seed obtains his foundation stock from the association. Such seed is either "first generation registered seed" (*i.e.*, the first, second, or third generation progeny of an improved selected strain), or "elite stock seed" (a pure stock of seed originating from a single plant, or obtained from a hand-selected seed plot).
3. Any seed of any kind of crop produced or selected by a member during the succeeding years is entitled to registration by the association.
4. Two kinds of certificates are given by the association—(1) for seed which has been grown according to regulations, and descended from "elite stock seed," such seed being marked "registered seed' and (2) for pure "elite stock seed."

5. No certificates are issued unless the seed be (*a*) pure as to variety and true to type; (*b*) free from seeds of other cultivated plants; (*c*) free from seeds of weeds coming within the meaning of the term "noxious weeds" as applied to the Seed Control Act; (*d*) free from or containing not more than a total of one seed of other weeds of minor importance; (*e*) well matured, clean, sound, plump, of good size and colour, and free from disease; (*f*) up to the percentage standard of vitality recognised for good seed of the kind under the Seed Control Act.

The methods thus outlined are eminently successful. Already the membership of the association runs into considerable numbers, and the demand for "registered seed" is greater than the supply.

The Department of Agriculture in New South Wales has already taken the initial steps for the production of better seed, and the lines upon which it is proceeding have already been indicated in the *Gazette.* The method adopted differs from those in Canada and Sweden in the fact that the Department deals directly with the farmer. The principle of producing pure improved seed is such a vital one that the scheme merits the attention and co-operation of all good farmers.

LOCAL RESULTS WITH GLENCOPE WHEAT.

GLENCOPE wheat is a product by Mr. Henry S. Cope, of South Australia, who recently sent a sample to the Department for trial in the drier parts of the State. The seed was sown at Temora Experiment Farm, the manager of which subsequently supplied the following report:—

"Sowing took place on 21st May at the rate of 50 lb. of seed and 56 lb. superphosphate per acre, but germination was not effected until after the rain in June. The variety proved to be of the purple straw type, maturing at mid-season, somewhat resembling Steinwedel, the ear, however, being more closely packed, and the grain holding more firmly. It stools fairly well, produces a tall straw which stands up satisfactorily, and acquires a purple colour prior to ripening. It is easy to strip, but holds its grain satisfactorily. The plot of Glencope yielded 15 bushels 22 lb. per acre, and the yields of the other varieties sown in the paddock under similar conditions (with the exception that they were sown in large blocks) were: Gresley No. 83, 21 bushels per acre; Hard Federation, 18 bushels; Firbank, 16 bushels."

THE only effective method of getting rid of docks is to dig them out with the mattock, making sure that the roots are taken out. Constant cultivation between rows of maize and potatoes, &c., will usually keep docks in check, but in lucerne fields or pasture the first-mentioned method is the only means of control.—A. J. PINN, Inspector of Agriculture.

Varieties of Oats Tested in New South Wales.

J. T. PRIDHAM, Plant Breeder.

ALTHOUGH the oat crop is not nearly of the same value to this State as wheat, the area sown has been steadily increasing since 1914. It is satisfactory to note this, because large quantities of oats for feed purposes are still imported whereas we should be in a position to be self-supporting in this respect.

Oats are most useful to the wheat farmer, being, for one thing, the crop that it pays best to grow of those rotations suited to combat take-all. As in the case of wheat, the variety that matures its grain early is most valuable under our climatic conditions; an oat that can do this and at the same time develop a plump grain is the ideal one for the grower.

The list of varieties presented in the accompanying tables comprises most of the oats tested by the Department from time to time, but it is not claimed that it is by any means complete. Unimportant varieties, those little known and only suited for cold countries, have been omitted. Any that have in recent years come before the public have been included, with the object of providing a guide to the farmer rather than a catalogue of all known varieties that have been imported. We cannot supply seed of these oats, except of those recommended by the Department, and we would strongly advise growers to sow quite a small patch of an introduced variety before buying a quantity. A plump good sample will not produce similar seed if the variety is unsuited to the district, and on the other hand an indifferent sample of a proved variety will often yield a good crop.

In the column indicating the season of the varieties, "E" represents early maturing, "M" midseason, and "L" signifies late ripening. The colour of the grain is in general a constant character, but Algerian, for instance, is often of a pale brown tint in warm districts and dark brown in cool ones. An oat that is called early in England or America is not usually so here. The time of maturity of each variety is stated in accordance with its behaviour when grown in this State.

Caution.—It should be understood that the list does not in any way recommend the varieties named. It merely gives general information for the benefit of farmers. For convenience, however, the names of those varieties that are recommended by the Department for various purposes are printed in black type.

VARIETIES of Oats tested in New South Wales.

Variety.	Season.	Character of— Straw.	Character of— Leaves.	Appearance of Grain.	Breeding or Origin.	Defects.	Distinguishing characters and good points.	Districts suitable.
Abed Danish Giant	L	Coarse	Broad	White, medium short.	Denmark	Too late	....	Only cold.
Abruzzes	M	....	....	....	Algeria	....	Closely resembles Algerian	....
Abundance	L	Coarse	Rather broad.	White, medium short.	England	Rather late	One of the best late varieties	Only cold.
Algerian	M	Fine	Not broad	Brown, long	Algeria	Sometimes lodges	Good general purpose oat; reddish straw.	General.
Algerian Tartar	M	Medium coarse.	Not broad	Creamy, long, not stout.	Departmental crossbred (Algerian x White Tartarian).	Not so good for grain as hay.	Reddish; strong straw	General.
Argentine	E	Fine	Not broad	Brown, long, slender	South Africa	....	Resembles Algerian	Warm.
Bancroft	M	....	....	....	South Africa	....	Seems identical with Algerian	Warm.
Banner	L	Coarse	Broad	White, medium short.	U.S., America	Too late	....	Only cold.
Bathurst Early	E	Medium coarse.	Inclined to broad.	Brown, short	Departmental crossbred (Algerian x Carter's Cluster).	Somewhat weak straw.	Reddish straw when ripe	Central West, and Riverina.
Bathurst No. 5	E–M	Medium fine.	Medium broad.	Brown, medium short.	Departmental crossbred (White Ligowo x Algerian).	Stout awns	Does not shake; general purpose; reddish straw.	Temperate.
Belgian Black Winter.	L	Fine	Narrow	Black, fairly long	France	Too late	Only adapted for grazing	....
Beseler's Prolific	L	Coarse	Broad	White, medium short.	England	Too late	....	Only coldest.
Big Four	L	Coarse	Broad	White, short	U.S., America	Rather late	....	Only coldest.
Black Algerian	M–L	Fine	Not broad	Black, long	Algeria	....	Very like Algerian, but ripens later.	Temperate.
Black Bell	L	Medium fine.	Medium broad.	Black, medium length.	Sweden	Too late	Grazing variety	Coldest.
Black Mogul	L	Medium fine.	Medium broad.	Black, medium to long.	Sweden	Too late	Grazing variety	Coldest.
Blue Stem	...	....	....	....	....	....	Identical with Algerian	....
Boswell's Winter	L	Very fine	Narrow	Black, long, not very plump.	U.S., America	Too late	Stools heavily; a grazing oat	Coldest only.
Brown Calcutta	E–M	Fine	Not broad	Brown, long	South Australia	Straw weaker than Algerian; apt to lodge.	Similar to Algerian; ripens earlier	Same as Algerian.
Burt	...	....	....	....	....	....	Closely resembles Algerian	....
Calcutta	...	....	....	....	....	....	Same as Brown Calcutta	....
Cape	...	....	....	....	....	....	Same as Brown Calcutta	....
Carter's Royal Cluster.	L	Coarse	Broad	White, medium short.	England	Too late	....	Only cold.
Champion	M	Medium fine.	Not broad	Pale yellow, short, small.	South Australia	Straw rather short	....	General inland.
Cowra No. 22	E	Fine	Not broad	Pale dun, large	Departmental selection from Ruakura.	Straw slightly weak	Medium stooler; tall straw	Warm and coastal.

VARIETIES of Oats tested in New South Wales—*continued.*

Variety.	Season.	Character of— Straw.	Character of— Leaves.	Appearance of Grain.	Breeding or Origin.	Defects.	Distinguishing characters and good points.	Districts suitable.
Cowra No. 25 ...	E	Fine ...	Not broad ..	Light brown, large	Departmental selection from Sunrise.	Scanty stooler ...	Very early; does not shake; straw reddish.	Dry and warm.
Danish Island ...	L	Coarse ...	Broad.	White, medium length.	Denmark	Too late	....	Only cold.
Defiance	L	Coarse ...	Broad.	White, medium length.	Europe	Too late	....	Only cold.
Dun	L	Coarse ...	Medium broad.	Dun, medium length.	England...	Too late	....	Only cold.
Early Burt ...	E-M	Fine ...	Not broad ...	Yellow, long ...	Western Australia ...	....	Resembles Algerian, but earlier...	General.
Early Red Texas	...	....	....	....	....	....	Very similar to Algerian ...	....
Fulghum	E M	Fine ...	Not broad ...	Pale brown, medium long.	U.S., America	....	Rather like Algerian	....
Gartor's	L	Coarse ...	Broad ...	White, rather short	England...	Too late	....	Coldest only.
Glen Innes No. 1	M	Medium fine.	Medium broad.	Brown, medium short.	Departmental crossbred (White Ligowo x Algerian).	....	Fine awn	Temperate and cold.
Gold Rain ...	L	Coarse ...	Broad ...	White, medium short.	Sweden	Too late	....	Coldest only.
Guyra	E	Medium fine.	Medium broad.	Dark brown, short..	Departmental crossbred (White Ligowo x Algerian).	Coarse awn ...	Taller straw than Lachlan, and stools slightly more.	Temperate and cold.
Kelsall's	E	Fine ...	Not broad ...	Yellow, long ...	Victoria	Straw rather short for hay.	Resembles Algerian	Riverina.
Kherson	M	Fine ...	Medium broad.	Light yellow, medium to long, not large.	U.S., America	....	Suitable for rack hay	Temperate and cold.
Lachlan	E	Medium fine.	Medium broad.	Brown, rather short	Departmental crossbred (White Ligowo x Algerian).	Stout awns ...	Strong straw; reddish tint; a general purpose and grain oat.	Wheat belt generally.
Leader	L	Coarse ...	Broad ...	White, medium short.	England...	Too late	....	Only cold.
Million Dollar ...	...	....	....	....	....	....	Same as Algerian	....
Mortgage Lifter (1).	...	....	....	....	....	....	Same as Algerian	....
Mortgage Lifter (2).	L	Coarse ...	Broad ...	White, medium length.	Western Australia (originated from Sweden).	Too late	A side oat like White Tartarian...	Coldest only.
Newmarket ...	L	Coarse ...	Broad ...	White, medium length.	England...	Too late	....	Coldest only.
"OAC 72" ...	L	Coarse ...	Broad ...	White, medium length.	Canada	Too late	Side oat, heavy stooler	Coldest only.
Potato	L	Coarse ...	Broad ...	White, medium length.	England...	Rather too late ...	Hutchinson's strain about the best; grown in New England.	Cold only.
Red Rustproof ...	M	Fine ...	Not broad	Brown, medium long.	U.S., America	Straw not quite so strong as Algerian.	Resembles Algerian	General.

VARIETIES of Oats tested in New South Wales—*continued.*

Variety.	Season.	Character of—		Appearance of Grain.	Breeding or Origin.	Defects.	Distinguishing characters and good points.	Districts suitable.
		Straw.	Leaves.					
Red Texas ...	...	....	....	....	....	....	Very similar to Algerian ...	....
Reid's New ...	L	Coarse ...	Rather broad.	White, medium length.	....	....	Much like White Tartarian, but grain somewhat shorter.	Coldest only.
Ruakura ...	E	Fine ...	Not very broad.	Dun, medium length.	New Zealand; selection from Argentine.	Straw weak; grown inland.	General purpose	Coastal.
Sensation ...	L	Coarse ...	Broad ...	White, medium long.	....	Too late ...	Compact head, tree type ...	Cold only.
Sixty Day ...	M	Fine ...	Medium broad.	White, medium long, not large.	U.S., America ...	Straw slender ...	Suitable for rack hay ...	Temperate and cold.
Skinless ...	L	Medium fine.	Medium narrow.	Naked, long ...	China	Not very productive.	Loose chaff, spreading head ...	Temperate.
Smyrna ...	E	Fine ...	Not broad ...	Brown, long and large.	U.S., America ...	Stools somewhat less than Algerian.	Resembles Algerian ...	Temperate and warm.
Sparrowbill ...	L	Coarse ...	Broad ...	White, quite short	Tasmania ...	Too late ...	....	Only cold.
Spooner Hart ...	...	....	....	....	....	....	Identical with Algerian ...	....
Starke's Hooimaker or Hooimarkt.	E	Fine ...	Not very broad.	Dun, medium length.	U.S., America ...	....	Loose, long, open head ...	Coastal and temperate.
Stable King ...	L	Coarse ...	Broad ...	White, medium long	Europe	Too late ...	....	Cold only.
Storm King ...	L	Very coarse.	Broad ...	White, rather short	Europe	Too late ...	....	Cold only.
Sunrise ...	E	Medium coarse.	Not very broad.	White, large, long	Departmental selection from Algerian.	Spare stooler ...	Tall straw, general purpose, rust escaping.	Warm, hot, and coastal.
Surprise ...	L	Coarse ...	Broad ...	White, medium short.	Europe	Too late ...	....	Cold only.
Tartar King ...	L	Very coarse.	Broad ...	White, medium short.	Europe	Too late ...	....	Cold only.
Tasmanian Giant	L	Coarse ...	Broad ...	White, medium length.	Tasmania ...	Rather late ...	Among the best of the white feed oats.	Cold only.
Victory ...	L	Coarse ...	Broad ...	White, medium length.	Sweden	Rather late ...	....	Cold only.
White Bonanza ...	L	Coarse ...	Broad ...	White, medium length.	U.S., America ...	Too late ...	....	Cold only.
White Horse ...	L	Coarse ...	Broad ...	White, medium length.	Europe	Too late ...	....	Cold only.
White Ligowo ...	L	Coarse ...	Broad ...	White, medium ... length.	France	Coarse awn ...	One of the best white oats ..	Cold only.
White Tartarian ...	L	Coarse ...	Broad ...	White, medium length.	Europe	Too late ...	....	Coldest.
White Tartarian ...	L	Medium coarse.	Medium broad.	White, long, slender	England... ...	Hay not very palatable to stock.	Heavy cropper; side type of head.	Cold only.
Wild or Black ...	E	Fine, slender.	Not broad ...	Grey to black, and very hairy.	Europe	A persistent weed; very coarse awn and husk.	Sometimes of value as feed; a horseshoe-shaped mark at base of grain peculiar to this oat.	General.
Winter Turf ...	L	Very slender.	Narrow ...	White, medium size and length.	Europe	Very late ...	Heavy stooler, suited for grazing	Coldest.
Winter Turpe ...	...	....	....	....	U.S., America ...	....	Closely resembles Algerian ...	....

Foot-rot in Sheep.

CHARLES L. O'GORMAN, M.R.C.V.S., Government Veterinary Officer.

Owing to the occurrence of a series of dry seasons, foot-rot in sheep, at one time so prevalent in New South Wales, has greatly diminished in recent years, and in some districts it has almost disappeared. This fact illustrates strikingly the influence of the absence of moisture in arresting this disease. Unfortunately, it is the good seasons, with their rains and moisture, that are most favourable to the development of the disease, and unless considerable care in exercised a recrudescence is to be expected in the event of a return to better seasons with a more abundant rainfall.

The subject is one of considerable interest to flock-owners and some useful purpose may be served by briefly reviewing the causes, symptoms, and methods of controlling and treating this scourge to sheep, as much trouble, annoyance, and loss may be avoided by prompt and efficient action.

Causes.

For many years great controversy existed as to the cause of this disease. It is now generally recognised that there are two forms of foot-rot in sheep —(1) a simple form following on mechanical injuries, and (2) a very virulent necrotic form known as "contagious foot-rot." The former is due to infection with pus organisms which gain entrance to the tissues through injuries to the horn, such as excessive wearing away, scalding, or a breaking of the horn substance; as a rule, a few sheep only are affected.

The contagious form is due to a specific organism, the *Bacillus necrophorus,* which, when introduced, spreads rapidly through the flock, the affected animals spreading the disease by contaminating the pastures with which they are brought in contact.

Under this heading must also be considered certain conditions which facilitate infection—very potent factors, which may be regarded as accessory causes. Chief amongst these is moisture, as in wet seasons and badly-drained pastures, which bring about masceration or softening of the horn. Other predisposing conditions are accumulation of mud between the digits (which become hardened masses causing abrasions), overgrowth of the horn with incurving of the wall, long grass dragging between the digits (causing lacerations—a fruitful source of spreading infection), in a word, any condition which brings about a breach of surface or enfeeblement of the tissues.

Symptoms.

Attention is generally drawn to the disease, in the first place, by the occurrence of lameness in one or more sheep, each day adding to the number attacked. The fore-feet are most frequently affected. The lameness, which is slight at first, gradually becomes more pronounced as the disease progresses, and the affected animal lags behind the flock, rests frequently, and will be noticed to lie about a good deal; when the fore-feet are affected it walks about grazing on its knees, but remains down when the hind feet are affected.

On an examination being made of a lame foot in the initial stages of the disease it is found hot and tender with some swelling of the coronet and between the claws; later the affected parts become red and moist, abscesses may form, or the whole of the interdigital surface may become raw and ulcerous, exuding a fluid with a most offensive odour. The inflammation extends, invading the tissues beneath the horn, which becomes detached, giving lodgment for a quantity of foul matter which has a tendency to burrow still further; the horn may peel off, or the whole hoof may become loosened and detached, exposing the sensitive vascular structures beneath, from which masses of new inflammatory growths sprout out in a fungus-like manner. In infections with the *Bacillus necrophorus* sloughs and masses of dead necrotic tissue are produced, the necrotic process excavating cavities in the inflammatory swelling and extending as far as the ligaments and joints. Owing to the pain which the animal experiences in movement rendering it difficult for it to obtain sufficient nourishment, it rapidly falls away in condition and becomes very poor. As a result of lying with its feet beneath it, the discharges contaminate the wool, and flies are attracted and further aggravate the condition; complications may then occur and death put an end to the animal's suffering.

Such is the termination to be expected as the result of neglect. In some cases recovery with more or less deformity of the foot may take place spontaneously, but when prompt and effective treatment is adopted recovery is generally complete.

Treatment.

In order to obtain the best results treatment must be adopted early, while the disease is still in the initial stages, and before irreparable structural changes have occurred; the importance of this cannot be too greatly stressed, otherwise treatment is tedious and the results uncertain. A great variety of dressings have from time to time been advocated by various authorities. Of these the one which experience has shown to be the most reliable is the well-known stockman's standby, bluestone (copper sulphate), the antiseptic, stimulant, and astringent properties of which make it admirably suitable as a dressing for foot-rot. Used for this purpose, a solution in the proportion of 6 oz. of bluestone to 1 gallon of water is sufficient; stronger solutions are unnecessarily caustic and are apt to damage the tissues. When making the solution a wooden or enamel vessel should be used, as copper sulphate corrodes metals. The quantity of copper sulphate prescribed will dissolve in a quart of boiling water. Cold water is then added to make 1 gallon. Larger quantities in similar proportions may be used, of course. The dressing is applied by means of a brush or cotton swab, or by holding the affected foot in the liquid for two minutes. This treatment is repeated on the following day, and as often as may subsequently be required. In slight cases one or two dressings may be sufficient.

To prepare the feet for the dressing remove all accumulations of mud, &c., all overgrown, distorted, loose, and under-run portions of horn being cut carefully away. The success of the treatment depends largely upon the thoroughness and care with which this preliminary preparation of the foot is carried out. The more advanced cases with profuse granulations and abscesses require special attention. Abscesses and fistulæ must be opened and excessive granulations (proud flesh) or fungus growths removed with the knife, any bleeding being checked by a compression bandage. When much horn has been removed, the foot must be protected by a dressing of Stockholm tar. In all cases soiling of the feet by dust and mud after dressing must be avoided as far as possible.

When dealing with large numbers of sheep it will simplify matters to muster the flock and separate the sound from the affected animals, carefully examining the latter. If they are numerous it is a good plan to divide them again into two lots—those that are only slightly affected and likely to get well after one or two dressings, and the advanced cases which will require much longer treatment. The dressing may be conveniently and expeditiously carried out by means of a foot bath. This may consist of a watertight wooden trough about 10 feet long 20 inches wide and 10 inches deep. A suitable dry position should be selected for this, low hurdles should be run along each side to prevent the sheep jumping out, and pens made at each end for holding the sheep before and after the bath. A batten floor should be provided for the sheep to land on from the bath, or some other provision made to protect the feet from mud.

When required for use the trough should be filled to a depth of about 4 inches with the copper sulphate solution mentioned above. The sheep should then be passed slowly through, care being taken that they do not rush through too quickly or walk through on three legs, so that the affected foot escapes treatment. After passing through the bath they should be held in the pen for a while to allow excess solution to drain off.

After treatment the sheep should be run on to a fresh, dry, uncontaminated pasture; on no account should they return immediately to the old infected one, as some time must be allowed for it to dry and freshen up by the action of the sun. Advanced cases of the disease should be kept by themselves, so that they may be conveniently handled for further treatment. When outbreaks have occurred it is a wise precaution to pass the whole of the flock through the foot-bath before putting them on to a fresh paddock.

Precautions.

Precautions consist in avoiding those conditions which have been mentioned as accessory causes. During wet seasons remove the flock to high ground, or the best drained paddocks. When pastures are moist special vigilance is required, frequent changes of pastures being necessary. At all times avoid overstocking. When the disease is prevalent care must be exercised when purchasing sheep to be added to a healthy flock; a few days in isolated quarters before permitting them to join the main flock may prove to be time and effort well spent.

It must not be forgotten that some breeds of sheep are more predisposed to foot-rot than others. The Romney Marsh, because of the conditions under which it has been bred for generations, is the most resistant; the Merino, on the other hand, is most susceptible.

Walking the sheep over freshly-slaked lime thrown down at the entrance to the paddock tends to harden the horn and acts as a preventive.

WORKING UP A DAIRY HERD.

IF I start with an average herd and a good bull, is it advisable to mate him with his own progeny, or does close breeding cause deterioration? The reply was somewhat as follows:—

The best method is to breed from the average herd, using a highly-bred bull of pure breeding with good milk records among his female relatives. Do not mate him with his own heifers, but, when a change is necessary, procure another bull of the same breed. Line-breeding can only be carried out in a herd of good outstanding qualities, and the average breeder is not advised to attempt it. Close breeding causes either improvement or deterioration according to the ability of the breeder to note any lack of type or constitution, and his skill in rectifying those defects. The herd, however, at commencement must be first-class. Close breeding has never been undertaken by this Department, it being inadvisable under ordinary conditions.—J. A. ROBERTSON, Herdmaster.

PROTECTING ORCHARDS FROM FROST WITH SMUDGE-POTS.

IN districts subject to frosts it is now fully recognised by orchardists in California that a good "smudging" plant is an absolute necessity, and any cost in this direction is looked upon as a sound investment and an insurance of the crop. The outfit consists of a number of black iron pots, shaped like ordinary flower pots, supplied with loose-fitting lids. A cross made of strips about 1 inch wide is riveted inside each, about ¾-inch from the top.

The pots are made in two sizes, namely 5 quarts and 7 quarts. They are filled with a crude cheap oil, and placed under the trees. The number of pots used per acre depends upon the severity of the frosts in a particular district; for instance, where not more than 6 degrees of frost are usually recorded twenty pots per acre would be sufficient; for 8 degrees, thirty pots; and for 10 or more degrees, up to forty pots per acre.

A close watch is kept on the temperature, and when it begins to freeze the pots are placed in the middle of the rows of trees and lighted. The flame striking the cross-piece in the pot throws up a dense smoke, which is the object aimed at. As the oil burns down the pots are refilled, and when the danger is passed the lids are dropped on and the flames extinguished. The pots are then put under the trees, out of the way of cultivation, and during the summer are stored in any convenient place.—Extract from report by Mr. J. BRADY, Cannery Superintendent, Water Conservation and Irrigation Committee.

The Culture of Sugar Cane in New South Wales.

[Concluded from page 184.]

A. H. HAYWOOD, Manager, Wollongbar Experiment Farm.

THE diseases to which sugar-cane is liable in this State are not numerous, but, as has been indicated in the earlier articles, they have had a marked effect on the areas devoted to the crop and on the profits derived by the growers. As with many other classes of produce, the cane-farmer is disposed to regard somewhat lightly the appearance of disease until the effects have become manifest and serious loss has been entailed. Then there is a hurried resort to some new variety, and perhaps an injured appeal to the Department of Agriculture for assistance.

Incidental reference has already been made to the influence of clean cultivation, combined with judicious selection of the variety and the seed as means of prevention, and it can only be repeated now that these measures—cheaper than all others—are also the most effective. The grower must, however, first know how to recognise each disease and how its spread may be prevented.

For the following notes on the four diseases most common in New South Wales, I am indebted to Mr. D. S. North, plant pathologist to the Colonial Sugar Refining Company, Limited, who has done valuable work in this sphere.

Gumming.

Gumming is most surely detected by the tiny yellow spots of gum which ooze out on to the cut ends of the canes. These spots quickly appear without treatment in severe cases, but in mild cases suspected canes freshly cut into short lengths should be enclosed in a tight can (*e.g.*, a billy-can) to sweat for two or three hours before looking for the gum spots.

At quite an early stage of gumming, peculiar narrow streaks, spotted with yellow and orange, turning into withered streaks towards the leaf-tips, appear on some of the older leaves. Special attention should be given to these leaf-streaks, because frequently they will draw attention to the presence of gumming in an otherwise healthy-looking field of cane. They may even be found before it is possible to detect any gum-spots, although these can usually be obtained eventually by choosing and sweating a number of the most likely-looking stalks.

In advanced stages, numerous signs of ill-health appear, including white leaves, dead and dying canes, gum cavities in the stalks near the tops, &c., &c.

All of the present approved varieties are likely to be attacked, although they are resistant compared to some grown in the past. Malabar is the most highly resistant, and therefore the safest variety to plant on farms where this disease is present. No immune variety is known.

Leaf-scald.

Two distinct phases occur in this disease. In one phase, whole stalks, sometimes whole stools, suddenly wither and die. In the other, white or withered streaks appear in the leaves and all the buds on the stalk sprout into side-shoots; the leaves sometimes turn partly white, and show a tendency to wilt and to wither at the tips. Either one of these phases may occur without the other, or both may appear together in the same stool.

The peculiar streaks in the leaves provide the best symptom for its definite recognition. They are usually straight, narrow, even, well-defined, whitish streaks, one or several in a leaf, and may either run throughout the entire length of the leaf-blade and leaf-sheath, or only part of this distance. Towards the leaf-tip, they sooner or later turn into a withered streak. The discovery of a streak in one single leaf is sufficient to diagnose the disease.

Where the withering phase occurs alone, sometimes no characteristic symptom indicating leaf-scald as the cause of death can be discovered. But frequently, peculiar small, sickly shoots (suckers) bearing the typical leaf-streaks may be found by searching at the base of the stool.

In the other phase, the leaf-streaks may readily be found, both in the ordinary leaves of the stalk and in the leaves of the side-shoots and the small suckers.

Of present approved varieties, Mahona alone becomes badly affected; N.G. 16 may be attacked in isolated stools, as also may most other varieties, but to a still smaller degree.

Fiji Disease.

Fiji disease shows itself in short, stunted growth with small, deformed, wrinkled leaves, on some of which scorched patches occur. Later, the buds on the stalks sprout and numerous small suckers spring from the ground.

Peculiar galls are found on the underneath side of the leaves, in the form of small, elongated lumps or ridges, both on the midribs and on the leaf-blades. These galls provide the best means for diagnosing the disease, especially as they may be found in its early stages while the cane appears otherwise healthy, as well as in all later stages.

Where it has gained a good hold, this disease has proved difficult to deal with, because all varieties are attacked by it. Mahona and Badila have proved to be rather more resistant than D 1135, N.G. 16, and most of the other varieties grown.

Yellow Stripe Disease.

This is also known as "Mottling" or "Mosaic" disease. It is recognisable by a peculiar mottling of the leaves, by which their green colouring is reduced to a lighter, more yellowish tint. In the more advanced stages, similar mottled markings may also be seen on the rind of the stalks.

These are the only evidences of disease to be found. Far from being destroyed, affected canes appear to the casual observer to have nothing wrong with them. Yet this disease causes severe losses of crop by reducing the vigour of growth, producing thinner, shorter stalks, fewer stalks per stool and generally a much lower weight per acre of cane. Further, its effects are cumulative, becoming more and more severe with each successive planting of diseased stock.

Many cases of the so-called deterioration or "running out" of varieties have undoubtedly been due to this disease.

All of the present approved varieties are liable to its attack. Of these, N.G. 16 and Mahona appear most resistant, while Innis 131, Malabar, and 1900 Seedling are rather susceptible.

Controlling these Diseases.

As already stated, clean cultivation and the planting only of healthy cane are the methods of control that the farmer should regard as most practical and effective. For the following summary of these methods in actual practice I am further indebted to Mr. D. S. North:—

1. Selection of healthy cane for planting.
2. Eradication of disease in the young crops.
3. Dealing with badly diseased crops.
4. Avoidance of knife infection.
5. Attention to drainage.

1. *Selection of Healthy Cane for Planting.*—This is of first importance, because, in the case of these four diseases, infected cuttings—if they grow—invariably produce diseased stools.

It has been found that a portion of the cuttings may prove diseased when they are taken from the healthy-looking stools in fields where disease is present. This is especially the case with gumming, leaf-scald, and Fiji disease. When healthy canes become infected by these diseases, they undergo a prolonged period of incubation, varying from a few weeks to twelve months or more, before any decided symptoms appear.

On this account, selection of healthy plants becomes more a matter of selecting healthy fields than of excluding diseased cuttings or stools.

It has been found unsafe to take plants from fields in which even traces of either gumming or leaf-scald can be discovered. Where not objectionable for other reasons, the planting of clean plants of a resistant variety, such as Malabar, on farms where gumming occurs, or any variety other than Mahona in the case of leaf-scald, is the safest course, for this also minimises the risk of the disease spreading to the newly-planted clean field from an adjoining diseased block.

In the case of Fiji disease we have no highly resistant varieties from which much aid may be expected. But selection of the cleanest fields, followed by careful exclusion of any diseased stools in those fields, has proved adequate for its control, without a change of variety.

Yellow stripe disease, on the other hand, has a short incubation period of two to three weeks, and is infectious at certain seasons only. Healthy plants may therefore be selected from diseased fields without undue risk being incurred, and change of variety on its account is not necessary.

2. *Eradication of Disease in the Young Crops.*—It is found in practice that odd diseased cuttings sometimes creep in in spite of every care being taken in selection of plants.

As most of these usually develop definite symptoms of disease during their first three to four months growth, they can be detected and removed, and their places filled with healthy plants at little expense, provided that only a small number be present.

This method of "cleaning up," to supplement selection of plants, is especially useful with Fiji disease.

When cultivation is completed and the cane laid by, further eradication becomes laborious, and usually does not pay. If further diseased stools appear, they may be dealt with when cultivating the young ratoons after the plant crop has been cut for the mill.

3. *Dealing with Badly Diseased Crops.*—Where the proportion of disease is too high for the eradication of individual diseased stools, the whole crop should be ploughed out as soon as possible, although it usually pays to leave it until cut for the mill. Its further ratooning would usually be undesirable, even though a payable crop might be expected, because the crop would breed infection for dissemination to any healthy cane in the vicinity.

4. *Avoidance of Knife Infection.*—It has been shown by careful trial, in the case of both gumming and leaf-scald, that cuttings from healthy plants may be infected by being cut with a cane knife previously used to cut diseased cane.

The risk may readily be avoided by disinfecting the cane knives while in use, by dipping them into disinfectant solution or into boiling water, on the principle of the surgeon who sterilises his knives to prevent blood poisoning.

Disinfection of knives is of most importance when stalks are being cut into cuttings, but it should also be used whenever cutting cane which it is intended to ratoon, on farms where even traces of these diseases are present.

5. *Attention to Drainage.*—Defective drainage favours diseases generally. This is especially the case with gumming, which may spread with great rapidity and kill most of the cane on badly-drained areas, whereas it makes little or no headway where drainage is really good.

TO MAKE CHARCOAL.

DEAD, dry wood is cut into convenient lengths, placed in a stack on end, or in a large basin dug in the ground, and set alight. When well incandescent, and just before the wood is falling to pieces, scatter the stack about, or put out by pouring on water. Any wood not properly charred can be used in the next burning.

There is another method of baking in a retort, but the above is recommended to farmers as cheaper, simpler, and quite as efficient. When cool, the charcoal is collected, bagged, and stored in a dry place.—C. W. BREBNER, Engineer, Hawkesbury Agricultural College.

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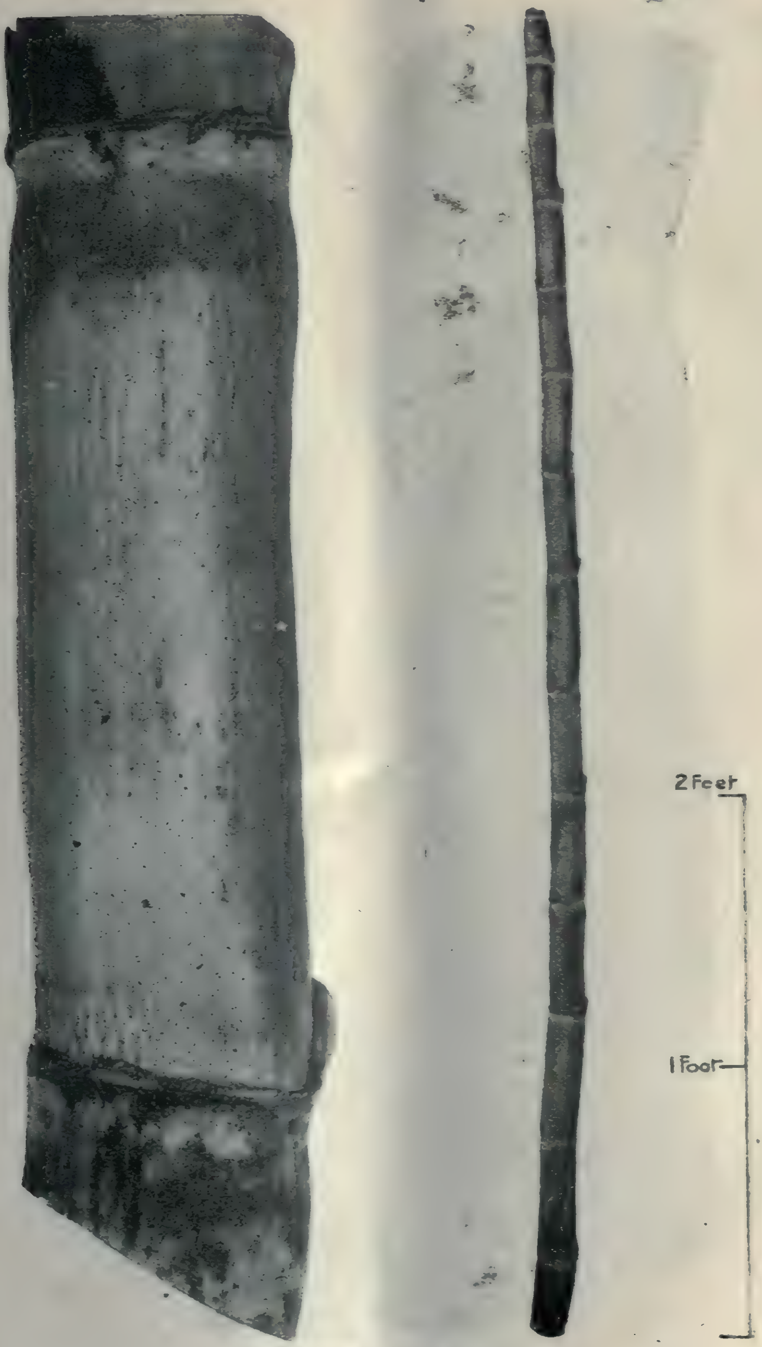
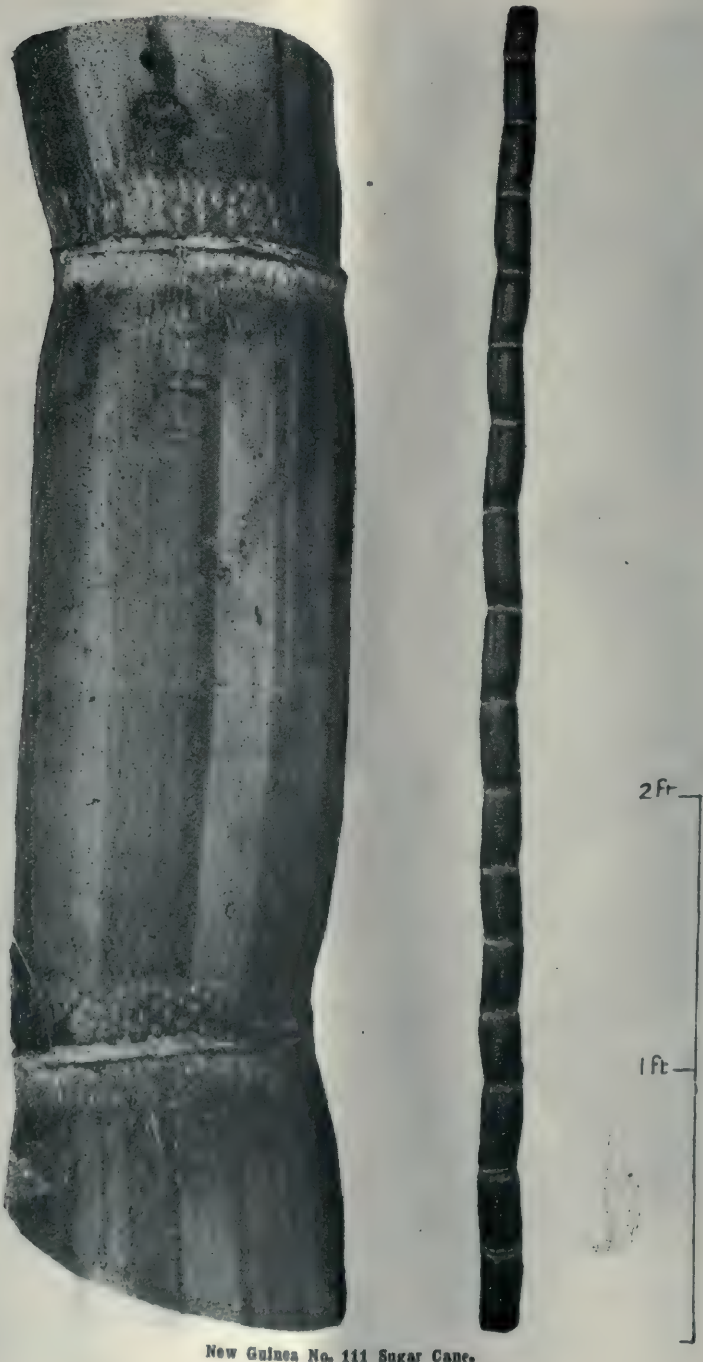


Louisiana 511 Sugar Cane.



New Guinea No. 111 Sugar Cane.

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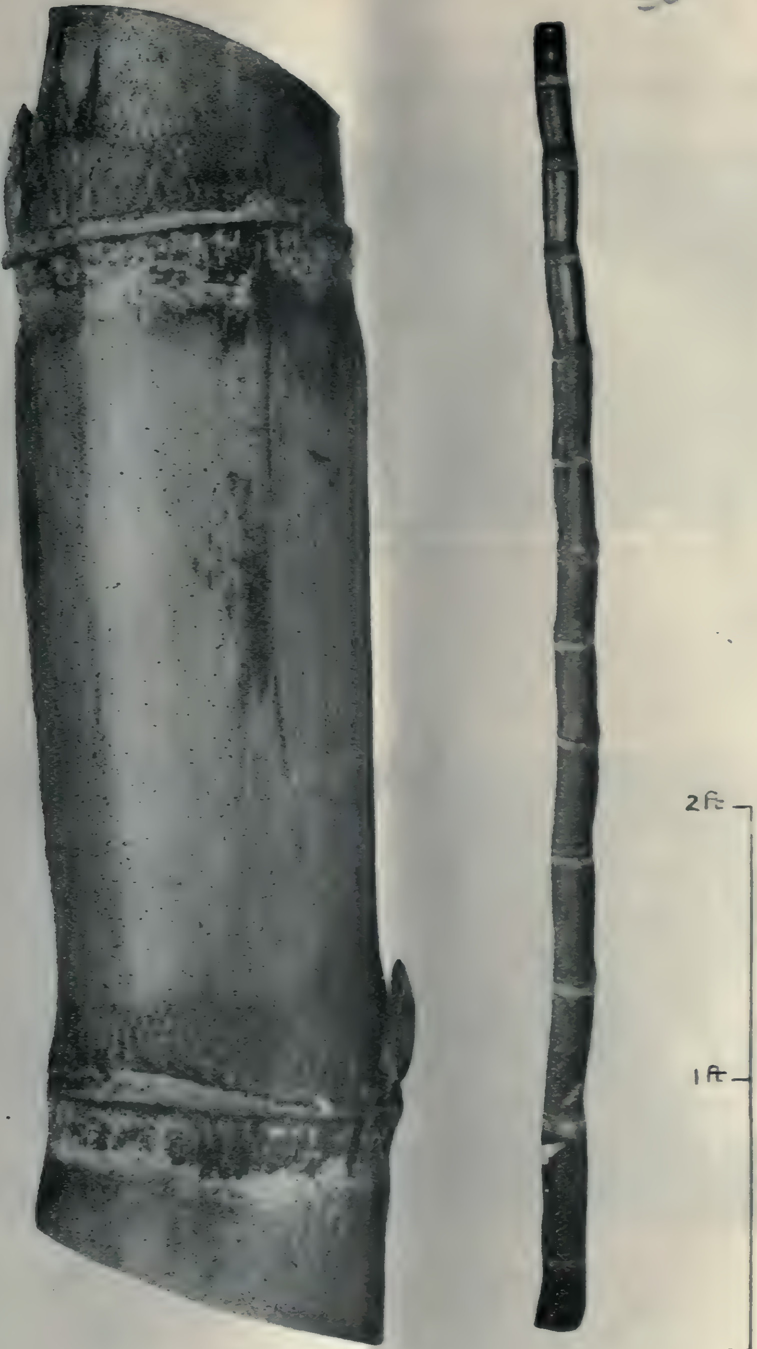


New Guinea 117 Sugar Cane.

Plot of Early Barletta Onions at Taree Estate, on the Manning.

Section of a row of Early Barlettas.

The bulbs are nearing maturity.

Farmers' Experiment Plots.

ONION TRIALS ON THE MANNING RIVER, 1920–21.

J. M. PITT, Assistant Inspector of Agriculture.

THE onion probably ranks second in importance to the potato as an old and widely-used root crop. In spite of its somewhat strong and unpleasant odour rendering it obnoxious to many people, it is found in the majority of homes, where its uses—uncooked, cooked, or as a flavouring agent in many "made-up" dishes—are well known. Further, it is credited with valuable medicinal qualities. Like the potato, the onion is available in greater or less quantities throughout the year, many varieties being admirably suitable for storage purposes.

While it is recognised that the cooler districts of the State, notably the southern, central, and northern tablelands, produce onions of the best quality, still there are portions of the warmer districts—the fertile areas bordering the rivers of the central coast, for instance—where highly profitable yields, and onions of fine type, have been grown successfully for many years. It seems remarkable that, with a crop adapting itself to a wide range of climes and soils, only such a limited area is sown annually in New South Wales. During the year 1918–19, the last period for which complete statistics are available, 335 acres were sown (this being a fair average), yielding 1,045 tons, which is only a fraction of the demand. The central coastal districts averaged approximately 4½ tons per acre for 60 odd acres, while the tablelands yielded 2½ tons per acre. Locally grown onions were only available on the wholesale market from November to May (inclusive), and in limited quantities, the bulk of our requirements coming from overseas (New Zealand) and from Victoria and Tasmania, Victoria being by far the largest supplier.

The following tables contain interesting figures relative to the wholesale prices (per ton) in Sydney for 1918–19 and the source of supply :—

Where Grown.	July	August.	September.	October.	November.	December.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
New South Wales..	Nil.	Nil.	Nil.	Nil.	14 15 3	12 13 3
Victoria	15 18 6	18 10 3	25 13 3	33 12 6	21 2 9	12 13 9

Where Grown.	January.	February.	March.	April	May.	June.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
New South Wales..	12 2 0	15 11 3	13 13 3	13 15 0	15 15 0	Nil.
Victoria	12 5 0	15 10 0	14 2 6	14 2 6	15 4 3	16 12 3

It will be seen that the price of locally grown onions averaged approximately £13 17s. 10d. per ton, which for the central coastal areas at 4½ tons per acre would amount to over £60 per acre—a return that perhaps exceeds that obtained from any other commercial crop.

Farmers on the whole shun onion-growing, either through prejudice or dislike for pursuits requiring a little extra care or constant attention, or else they have tried and failed, and have then drifted into the channels which, if not quite as remunerative, pay well enough for the amount of energy expended.

In conjunction with Mr. R. Dyball, junior, the Department has just conducted a trial with a number of varieties on his farm, Taree Estate. To add further interest to the experiment, a section of the crop was irrigated by means of a Nunan spray system. That the application of water by artificial means during a dry season had a most beneficial result will be seen from the table of results below.

The Season.

Ideal conditions prevailed during July, continuous showers giving the young plants an assured foothold in the permanent bed. August was cold, dry, and windy ; a few useful showers fell during September and October. The first irrigation was given in the middle of October, and the last in November. Ample rain fell from then until maturity. It will be noticed that the difference in yields between the irrigated and non-irrigated sections was greater in the Barlettas—an early maturing variety—than in the Ailsa Craigs, the subsequent rains being of great benefit to the later maturing variety. The rainfall over the growing period was as follows :—July, 292 points, August 10, September 122, October 75, November 225, December 433, Total, 1,157 points.

Method of Sowing.

Success depends largely on whether the crop is to be cared for, or allowed to look after itself. A good beginning can be made by first raising seedlings in a seed patch, and afterwards transplanting into the main bed. Sowing the seed broadcast, or in rows in the permanent bed, are methods having very little to recommend them, especially where the areas are weed-infested. Weed-seeds germinate quicker and grow more rapidly than the onion, and are its greatest curse. The small seed-patch can be more easily tended to, a better germination results, weaklings can be discarded, the main bed is available for longer preparation, transplanting can be done in suitable weather, a better stand is assured, the bed can be more easily kept clean, the bulbs mature more evenly and earlier ; and above all, yields are greatly increased. The task of planting a large area in rows 3 feet apart, plants 4 to 5 inches in the row, seems rather strenuous, but the hand work necessary when onions are sown by other methods has to a great extent been eliminated by the planting out method ; seven or eight thousand plants can be planted out per day quite easily.

The Seed-bed.

Seed of the seven varieties were sown in a well prepared plot at the end of March. The site (selected for its freedom from weeds) was worked into a fine tilth by hand-digging, the surface inch or so being kept loose and the sub-surface firm. After sprinkling the seed evenly, the plot was watered carefully with a can and fine rose attachment. This procedure washes the soil lightly around the seed, providing ample covering. The secret of a good germination is to cover the seed lightly; the young shoots are weakly, and cannot push through a heavy covering. Care must also be taken to keep the soil moist (not wet) by watering at intervals. A covering made of hessian carried 12 or 18 inches above the bed on a frame keeps an even moisture and temperature, but must be removed as soon as the young plants are noticeable, otherwise they become drawn and weak. Germination was excellent. When necessary the patch was weeded and the weaklings thinned out.

Transplanting.

The plants were sufficiently advanced to transplant in July, being then about the thickness of lead pencils. Barlettas were transplanted first, followed by Longkeeping Spanish, Tripoli, Hunter Rivers, Silver King, Giant Roccas, finishing with Ailsa Craig.

No trouble was spared in previously preparing a good plot, as onions, like other farm crops, will only yield their best when treated properly. Following a crop of potatoes, the land was disc-ploughed, fallowed, and ploughed twice more, followed by several harrowings to bring it to a fine tilth. Shallow drills—really only lines—were marked out 3 feet apart. The young plants were bunched in boxes, part of the straggling top growth removed, leaving 4 inches of a sturdy plant, and the roots were nipped off to within ¾ inch of the bulb. The onion, being a hardy individual, can stand such treatment, and the operation expedites transplanting and does away with the possibility of the plant being pulled out by cultivation. Great care must be taken only to firm the roots and a very small portion of the bulbs in the soil, just enough to hold the plant firm and upright. The bulbs will not reach their maximum size nor thrive nearly as well if planted too deeply.

After Cultivation.

Weeds usually do not put in an appearance until the spring months. By this time the young plants have become firmly established, and can be worked amongst by hoe or horse without fear of damage. The crop was twice hoed and thrice cultivated to clean out the "middles" and restore the soil mulch after irrigation.

Harvesting.

Onions are ready to harvest when the tops begin to wither, indicated by the plants leaning over. This is caused by the substance being absorbed from the stalk by the bulb. Mr. Dyball pulls and leaves the onions in windrows in the field for a day or two to cure, or else lays them on the floor of the shed for the same purpose. It is advisable not to leave the crop too long in the field after maturing, otherwise second growth is encouraged, and this spoils the keeping qualities of the onion. The bulbs were disposed of locally, Early Barlettas realizing 3d. per lb., and the midseason and late varieties 2½d. and 2d.

Varieties.

White Early Barlettas.—A very early maturing (November), white-skinned, flat onion, many bulbs growing to 6 inches in diameter and weighing over 1 lb. Excellent flavour and mild ; not a good keeper.

Tripoli.—A white-skinned variety, maturing a little later than Barletta ; bulbs medium size. Flavour good ; not a good keeper.

Giant Rocca.—A reddish brown, globular-shaped onion, growing to a fair size, and maturing about the same time as Tripoli. Flavour good and mild ; not a good keeper.

Silver King.—Maturing about the same time as Rocca, an onion somewhat similar in shape to the Barletta, only deeper ; skin pink-tinged. A mild-flavoured, good eating variety ; poor keeper.

Ailsa Craig.—A pale-brown, globular-shaped onion of excellent quality, large size, and attractive appearance ; fairly firm. Flavour mild and good ; matures in January (late) ; fairly good keeper.

Hunter River Brown Spanish.—Seed sown rather too early ; broke into head too soon. Harvested simultaneously with the main Barlettas ; brown skinned, globular shaped, firm. Good flavour, rather hot and strong ; excellent keeper.

Long-keeping Brown Spanish.—A brown-skinned Spanish onion of good quality, very similar to the Hunter River type ; matured about the same time as Giant Roccas (December) ; firm. Flavour good, hot ; exceptionally good keeper.

YIELDS of Varieties of Onions.

Variety.	Irrigated Section.				Non-irrigated Section.			
	t.	c.	q.	lb.	t.	c.	q.	lb.
White Early Barletta	7	13	0	24	1	19	1	4
Ailsa Craig	7	7	1	8	4	4	1	24
Hunter River Brown Spanish...	6	8	2	18	2	10	0	10
Long-keeping Brown Spanish ...	6	4	2	26	2	7	0	16
Giant Rocca	5	11	3	24	2	2	0	26
Silver King	5	6	0	8	2	1	1	0
Tripoli	3	2	3	12	1	17	0	8

No fertiliser was used.

"Look at the work there is in it—keeping the stuff head down after it is cut so that the sap won't run out."

The remark was made by way of objection to the trouble involved in making silage. What answering echo it found in the minds of the hearers history does not relate, but it is perhaps necessary to add that the statement was made in all seriousness.

Tick Paralysis.

SYDNEY DODD, D.V.Sc., F.R.C.V.S., Lecturer in Veterinary Pathology and Bacteriology, University of Sydney.

Along the whole of the eastern coast of Australia a form of paralysis, accompanied by other symptoms, most common in the domesticated animals but occasionally reported in human beings, is well known; popular as well as professional opinion is unanimous in ascribing it to the bite of a tick, known as the "scrub tick." There is, however, more than one genus of tick, and several species inhabit the scrubs or thickly wooded parts of eastern Australia, and the name "scrub tick" is applied popularly to any of them, and, as a rule, indifferently.

Among the so-called scrub ticks are those which most stock men differentiate under the name of "bottle tick," on account of the large size which the fully engorged female attains.

The bottle tick appears to be either an *Amblyomma* or *Hyalomma*. In this connection Mr. L. Harrison, B.Sc., Lecturer in Zoölogy at the University of Sydney, informs me that he has examined numerous ticks from dogs in the neighbourhood of Sydney, and they have all been *Ixodes holocyclus*.

In Queensland and a small part of northern New South Wales, the cattle tick, *Margaropus annulatus*, is more or less prevalent, but popular view does not include this among the "scrub ticks." No scientific determination of the ticks removed from human beings or animals affected with tick paralysis in Australia appears hitherto to have been made, the nearest being such remarks as "it was almost certain," or "it was probably" a particular species, viz., *Ixodes holocyclus*. With regard to the experimental proof as to which, if any, of the so-called scrub ticks in this country is the cause of the undoubted cases of paralysis in human beings and animals, and so often fatal in the young of the latter, I have been unable to find any published record of any experiments, whether negative or positive. I have been informed that such experiments have been attempted at various times, but as the results have not been published the conclusion to be arrived at is that they were unsuccessful.

Tick paralysis is most commonly seen at that period of the year when ticks are most prevalent in the coastal scrubs, viz., spring and summer. In the more northern parts of eastern Australia, however, where the winters are seldom cold enough to arrest the life cycle of ticks in general, it may occur at any period of the year.

In susceptible individuals one tick is quite sufficient to give rise to very grave symptoms, and even death. The younger the animal the less favourable the prognosis.

As already stated, both human beings and animals may be affected, but the susceptible period appears to be during the early life of any particular species. I have not heard of an authenticated case in adult human beings, and only a few have been related to me in adult animals. In these latter cases the evidence was so circumstantial that it appears reasonable to conclude that adult animals are occasionally affected. I have not obtained any evidence that sheep are affected, although these appear to be the animals most commonly suffering in South Africa and British Columbia. As, however, practically no sheep are bred on the coastal scrub areas of eastern Australia, although a fair number are brought in from time to time for food purposes, this want of evidence may have no significance.

Most of the cases narrated to me of tick paralysis in adult animals, viz., cattle, horses, and dogs, have been where the animal has been heavily infested with scrub ticks. No deaths occurred. Possibly these were cases of massive intoxication. It is generally considered that immunity in adult animals is produced by previous intoxication. Whilst it is true that immunity, even in the young, can be produced in this manner, it is highly probable that the individual becomes naturally less susceptible to the effects of the tick with advancing age, independently of prior infestation.

Animals indigenous to the country appear to be naturally immune. This, however, requires to be experimentally tested, for the opinion may be based upon incomplete evidence. It is true that apparently no one has seen a wild animal affected with tick paralysis, even although various of the scrub ticks have been found on them, but in view of the fact that no characteristic lesions or causal organisms have been found in the disease, that the condition cannot be transmitted artificially (*vide* results of experiments to be described), and also that the invariable desire of wild animals when ill is to avoid the neighbourhood of other beings, human or otherwise, it is obvious that the view as to the immunity of young indigenous animals is not based upon an unassailable foundation. Nevertheless, I believe it will be found that they do possess some, if not an absolute immunity, even of an hereditary nature. The domesticated animals in Australia are all comparatively newcomers to the country, and therefore hereditary immunity has not had time to develop in them. Another hypothesis occurring to my mind is that native indigenous animals may have acquired immunity during the course of their existence by one or more tick infestations, the highly susceptible animals dying when very young.

Symptoms of Tick Paralysis in Animals.

The earliest sign is loss of appetite and slight dulness, as a rule followed by occasional acts of vomition. Later slight inco-ördination of the hind extremities is seen. This gradually increases in severity until the whole of the hindquarters are paralysed. The paralysis then rapidly extends forward until the animal is quite unable to use any of its limbs, and then lies inert. Occasionally convulsions may occur, but are by no means the rule. The paralysis appears to be entirely a motor one—that is, it does not affect the nerves of sense. Food is refused altogether, but vomiting is frequent, the vomit now being merely a bile-stained mucous. There is no increase in the body temperature. The pulse does not appear to be greatly affected, but respirations are often of the Cheyne-Stokes type. Finally, if the issue be a fatal one, a state of coma sets in, and the animal dies from respiratory failure. Recoveries may take place in the early stages of the disease, but when the paralysis has become general death nearly always ensues. The outlook is more favourable if the tick is removed before the condition has become established.

It is the popular view that paralytic symptoms appear soon after the tick has attached itself. This is an error and arises mainly because the owner of the animal does not observe the tick until the host begins to show unmistakeable signs of illness ; when, knowing the usual symptoms, the owner searches for the offender, which, when found, is usually, if not always, in an almost fully engorged condition. If the tick is removed soon after it has become attached paralysis does not ensue. This I have verified in a number of cases where recently-attached ticks have been removed from young dogs without any ill results following, save for some local inflammation due in most cases to the head of the tick being left behind in the skin.

Until the experiments were conducted by the writer nothing definite was known concerning the length of time taken for symptoms in animals in this country to set in after the attachment of the tick. The writer has seen a number of naturally occurring cases of tick paralysis, but they have nearly all been in an advanced stage of the disease, consequently one could only estimate how long the tick had been on.

The condition is also seen in foals, calves, and cats, the symptoms resembling those in dogs, save that with the exception of the latter, vomition is absent. It is said that young pigs are also affected. Probably this is correct, but I am of opinion that a number of reputed cases of tick paralysis in these animals are not due to ticks, but are rather that form of paresis so very common in young pigs everywhere, and due to other causes.

Although, no doubt, numerous *post mortem* examinations of animals dead from tick paralysis in Australia have been made, there are no records of such. Prior experimental work on tick paralysis in British Columbia, due to *dermacentor venustus*, has been successfully carried out by Hadwen and Nuttall (7 and 8). The present article only deals with the condition in Australia.

Historical.

The records of tick paralysis in Australia are not very numerous, and mainly relate to the condition as it occurs in human beings. Bancroft's is the only article I have seen describing the clinical symptoms in the lower animals, and this relates to dogs. Occasionally a paragraph has appeared in the various State *Agricultural Gazettes*, giving advice as to treatment of animals affected with tick paralysis, but nothing further.

1.—The first record of tick paralysis is by Bancroft, in 1884. He states that the tick of the Queensland scrub or thickly wooded districts is very poisonous to introduced animals, and that cats and dogs are frequently killed by it, although native animals appear to escape injury; that the tick generally attaches itself about the neck and ears of dogs and about the neck, groin, and armpit in man; that the results on dogs, particularly the long-haired breeds, and cats are more serious than in human beings; and that if the ticks are not removed in the course of a few days death may be expected. He never saw a puppy recover after symptoms had become established.

He describes the symptoms in full-grown strong dogs, as follows: In two or three days after the attachment of the tick the dog begins to look weary. Food is refused and, soon after, drink. The animal lies down in a place where it can remain undisturbed. Pups travel away and are rarely again found alive. Shortly after, weakness in the hind legs is observed, and in about five days from the attachment of the tick the animal becomes unable to walk, and may at times be seen to be timid and delirious. On attempting to rise up on his fore legs he may fall over insensible. In a few minutes he recovers consciousness. The lips are pale, the heart can scarcely be felt to beat, and the condition of fainting is clearly noticeable. There is great reluctance to take food or drink, and forcible feeding brings on a fainting attack. In a few days at the furthest he dies during an attack. Old dogs live much longer than puppies, and if the tick has been removed early, recovery may be hoped for.

The only cat he had seen affected lay unable to walk for a week. She was forcibly fed with milk during the time and made a slow recovery. No suggestion is made as to the particular tick implicated, which, considering the period when the article was written, is not to be wondered at.

2.—The next reference to tick paralysis is made by Professor Sir T. P. Anderson Stuart in his Presidential address in 1894 to the Royal Society of New South Wales. He states that he had collected records from a number of medical practitioners concerning the effects of tick bites on animals, and summarises the accounts of about one hundred cases in dogs, giving the clinical symptoms. It may be noted that no indication is given in the address as to the species or genus of the particular tick, but he remarks that there are apparently different ticks, some harmless, and others very venomous.

The portion of the address relating to tick paralysis is as follows:—"Young animals are particularly susceptible. At first there is moping, hot nose, and gradually-increasing muscular weakness, first in the hind limbs and then in the fore limbs, neck, and muscles of respiration. Obstinate constipation and retention of urine. Epileptiform attacks or prolonged convulsions may usher in a fatal issue. Or there may be no convulsions, and death ensues from heart failure, the pulse having been flickering, or from respiratory failure. Peripheral nerve paralyses have been seen during convalescence. One attack confers immunity, and in some districts where ticks abound dogs may be rendered immune by allowing the tick to remain on the animal until the first symptoms appear, which may be in a few hours. [*Note.*—He does not say whether this means from the time that the tick has first attached itself, or from the time the tick is first detected.] On recovery, the process is repeated once or twice, the dog then being protected."

3.—In 1912, Cleland, in a general article, makes reference to human infestation by ticks. Bancroft and Stuart are quoted, and he then refers in detail to two clinical cases diagnosed as tick paralysis in human beings, observed by two medical practitioners—the first in a child, with fatal results, and the other presumably in an adult, ending in recovery.

The points to be noted in the first case are—(*a*) The species of tick was not ascertained, but was guessed at, the remark being made that "the tick was almost certainly *Ixodes holocyclus*." The tick was removed and crushed under foot without examination. (*b*) The tick was called by the parent a "bottle tick". Now the popular name "bottle tick" is usually applied to a different genus than the *Ixodes*. (*c*) The rapidity of the onset of symptoms. These were stated to have set in within a few hours from the supposed time of attachment of the tick. (*d*) The size of the tick on the supposed second day of its attachment, viz., ½ inch x ⅜ inch.

Remarks *c* and *d* would appear to indicate that the tick had really attached itself some few days prior to the assumed period.

With regard to the second case, this is one in which the individual (an adult) was heavily infested with ticks (species not mentioned). About 200 were removed from various parts of the body. Within an hour after the ticks had attached themselves symptoms of faintness were noticed. Within four hours he showed extreme collapse, and weak cardiac action with syncope. There was no local irritation. The patient was ill for a week with cardiac symptoms but no paralysis.

Here one has to note the extraordinary rapidity with which symptoms set in. viz., one hour after the attachment of the ticks. It might be said that this was a case of mass intoxication, but could it not rather have been due to mental influence, especially if the patient knew, which was very probable, of the sinister reputation of scrub ticks?

4.—In 1913, Eaton described a case of tick paralysis in a child. It is the most complete description of the clinical symptoms in the human being as it occurs in Australia that I have seen, and they have so great a resemblance of those in the lower animals that it is reproduced here almost *verbatim*, only non-material parts being omitted.

"L.A.B., a girl of 4½ years, was brought to me on 3rd November last . . . with a statement by her father that she was paralysed from the bite of a tick. The patient had been in good health until the day prior to my first seeing her. On that morning, however, she took an unusually small breakfast and would take no food from then on. In the early part of the afternoon of that day she became restless, and about 4 o'clock it was noticed that she was unsteady on her feet. Having decided to put her to bed, the mother undressed her, and in doing so discovered a tick on the back of the right shoulder. Its presence had caused little or no discomfort and was quite unsuspected. The body of the tick was cut off, leaving the head and mouth parts embedded under the skin.

"The child's father, who was an intelligent bushman, described the parasite as a scrub tick, such as is commonly found on dogs. He said it was of a slate grey colour, and was flatter than the cattle tick (*Margaropus annulatus*). The foremost pair of walking limbs were much longer than those of the latter species. The body was about three-eighths of an inch long by about a quarter of an inch in breadth, this being about the average size at full development. I was unable to get more precise information than this, but the tick was almost certainly *Ixodes ricinus* or *Ixodes holocyclus.* The tick was cut off. . . .

"About 7 p.m., the patient vomited, and for the next couple of hours seemed more comfortable. During the remainder of the night, however, she was very restless and slept in short troubled spells, a total of only two hours. The bowels moved twice in the night, the motions being of a brown colour and of a semi-solid consistency.

"*Second day.*—In the morning the child vomited again three or four times, It was found now that she could not stand, and she appeared to the parents very ill. About mid-day the patient was sent to see me. . . .

" . . . Shortly before 3 o'clock she drank a few spoonfuls of milk, the first substance she had swallowed for thirty hours. . . . This abstinence from fluids is the more remarkable in consideration that the weather was very hot, that the patient had made a long journey in an open vehicle, and that she had vomited half a dozen times in the period.

"When I saw the child at 3 o'clock she was in a state bordering on delirium, but sufficiently conscious to be annoyed on examination. The temperature was 101·4 deg. in the axilla, and the pulse rate was 132. . . . Respirations numbered 36 per minute; they were short, shallow and jerky, and performed for the most part by the muscles of forced breathing. The skin was dry except for slight perspiration of the scalp. The eyes were somewhat glazed; the lids were drooped, but were not quite closed; the pupils were dilated and inactive to the stimulus of light and to that of pilocarpine. . . . The tongue was covered with a thin white fur and was moderately dry. The muscles of the legs and thighs were quite flaccid, and the lower limbs motionless save for movement which could still be made at the hip joints. The arm muscles could be moved, but with very little force, and those of the forearms were inactive. Knee jerks could not be obtained, nor could the wrist jerks, or the normal or other plantar reflexes. Owing to delirium, the sensations could not be estimated beyond that signs of annoyance were evident when stimuli of pain or tickling were applied to any part, either of body or limbs. . . . Over the lower part of the right scapula there was a bright pink patch about the size of a penny, neither raised nor indurated, and in the centre of this was a purplish-black spot quarter of an inch in diameter. In the middle of the spot was an aperture somewhat less than a pin's head in size, and through this one could see a greenish-grey body, which grated with a stony hardness against the point of a knife. A minute droplet of pus was expressed from the aperture. . . . The object felt with the knife, evidently the head and chitinous mouth parts of the tick, could not be removed without breaking into fragments. . . .

" *Third Day.*—During the next twenty-four hours the bowels moved nine times, the motions being liquid and bile-stained, and containing a considerable quantity of mucous. There was no evidence of abdominal pain, however, and there had been no more vomiting. Sleep had been moderately good. By this time the temperature had fallen to normal, breathing was deeper and easier; the mental state had cleared, although there was still undue irritability; the appearance of the face was nearly normal, and the child now took drinks of milk freely. There was no sign of return of voluntary movement to the legs, but the muscles were not so limp. The strength of the arms had improved, and the fingers could be moved, but not even such an object as a bunch of keys could be securely held in the hands. The pupils were still enlarged . . . the eyes were moved with apparently normal freedom. Acuteness of vision was not reduced, but accommodation was paralysed. A rough general test was made of the senses of contact, temperature and pain, but no abnormality was found. There was no notable feature in the urine."

" *Fourth Day.*—By the next day, the fourth since the onset of symptoms, the knee jerks were both obtainable but deficiently. The child could stand, and even walk a few steps with support. . . . Diarrhœa still continued, but was less severe."

" *Fifth Day.*—On the fifth day the patient could walk without support, but the gait was knock-kneed, so that each leg was brought more directly under the weight of the body. In walking, no attempt was made to rise on the ball of the foot. The pupils now reacted to light, but were still somewhat dilated. . . The pulse rate was 96, and the temperature still normal. . . . This was the last time I saw the patient, but I was informed that her progress to complete recovery within the next few days was uninterrupted."

5.—The latest record of tick paralysis in Australia is by Strickland in 1915. Apparently the case (a boy) was not observed by him personally, as he states that it was described by the mother of the affected child.

The boy (aged 11) whilst in the bush, must have picked up a tick although he did not notice it at the time. The tick attached itself in his ear. Four days later he complained of feeling sick and giddy. He was put to bed but became worse. All his muscles seem to be affected. He could not walk without asssistance and his face was quite crooked on one side. The doctor on examining the patient, found a large tick in his ear. It had been there a week. The tick apparently was removed, but recovery did not take place at once as his knees were very weak and his face was no better. However, with careful feeding and medicine the child was well again in ten days after the tick was removed. The doctor said that the tick had bitten near the facial nerve and had also poisoned his blood. A footnote by Nuttall states that unfortunately the tick was neither preserved nor identified.

In view of the foregoing, the writer had for some years endeavoured to obtain ticks for experimental work; but in spite of the prevalence o scrub ticks, and the frequency with which tick paralysis occurs in dogs around Sydney, no real start could be made until 1919. Numerous persons had been enlisted for the purpose of obtaining live ticks, but, unfortunately, in most cases where promises were fulfilled, although the intentions were good, when a tick was discovered attached to a dog or other animal, the offender would either be violently removed and the mouth parts left in the animal's skin, or some substance would be applied which would cause the tick to release its hold, but, at the same time, kill it. Such dread does the reputation of the "scub tick" inspire in the popular mind, that in no case could I persuade the owner to let a tick remain on his animal to mature. In quite a number of cases, however, ticks were brought to me, either in the nymphal or unengorged adult stage, before they had become attached to their hosts. They were all *Ixodes holocyclus.* This species of tick must either be extraordinarily delicate, or all must have been injured in removing them from their hosts, for, in all such instances, either the ticks had died before they could be put on an experimental animal (about twelve hours later), or they were so moribund that they refused to bite.

The difficulty of obtaining uninjured ticks was at last overcome by using my own dog as a collecting agent. He was encouraged to run in "bush" which was known to contain ticks. Immediately on his emergence he was carefully searched for these parasites. In this way, during 1919, about thirty adult unengorged ticks were obtained—at least half of them apparently quite uninjured. None of them had had time to attach themselves to the dog. The ticks, mostly females, but including a few males, were placed in suitable receptacles, and in from fourteen to twenty-four hours were placed on various animals, viz.: dogs, sheep, and guinea-pigs. Unfortunately, however, in spite of care, all of these ticks were either dead or moribund when placed upon the experimental animals, with the exception of three adult females and one adult male. The results obtained with these were, nevertheless, quite conclusive. A large number of experiments, although undoubtedly desirable for several reasons, would not have altered the positive results already obtained.

(To be continued.)

TO PROTECT FRUIT TREES FROM WHITE ANTS.

WHERE a fruit tree has been attacked by white ants, scrape away all the wood that has been perforated by the insects, tracing it as far into the ground as possible, and paint the wound with a solution made up of two parts Stockholm tar to one part of kerosene. To make the solution, warm the tar until it becomes liquefied, then add the kerosene and mix. Apply with a brush, rubbing the solution well into the wood.

White ants only attack trees that have decayed or been bruised beneath the surface, and care should be taken, therefore, when cultivating or ploughing, not to tear the roots or strike the butt of the trees. There is no known way of preventing white ants attacking a tree affected as described, for the insects are always present in the soil, awaiting their opportunity.—W. J. ALLEN.

Some Experiences with Fruit Under Irrigation.

F. G. CHOMLEY, Manager, and J. ARTHUR, Orchardist, Yanco Experiment Farm.

THE conditions that obtain on Yanco Irrigation Farm are, perhaps, less representative of those existing on the Murrumbidgee Irrigation Area than could be desired, but many of the results that have been secured are of undoubted value to settlers, and might well be accepted as suggestive to the whole area. Indeed, it is a matter for regret that settlers do not more fully avail themselves of the experience obtained on the farm. There are, of course, those who keep in touch with the officers stationed here, and there are some who are well known and regular visitors, but there remains a large number of growers who take little heed of the large amount of practical knowledge that is being accumulated, and that is available for them on application.

In the orchard the soil (as on most of the farm) is a heavy and impervious clayey loam that requires careful handling to get satisfactory results. On the irrigation area there is a good deal of similar soil—some even stiffer, though generally settlers have to deal with soil that is of lighter texture and more easily worked. Where good methods and the best varieties are employed on these better class lands, the crops are correspondingly heavier and there is no reason why they should not be also more profitable than on the experiment farm.

The method of applying the water in this orchard is to open four or five furrows between each row, and to admit the water by means of sluice boxes, 2 inches by 2 inches inside measurement.

It is important, in general practice, that the water should reach the end of the furrow within a reasonable time, say eight or ten hours, but without so large a head as to cause scouring. After that the flow through the sluice boxes may be reduced so as to allow only sufficient water to pass through to keep the furrows full from end to end without waste. This should be continued long enough to allow the whole area to be thoroughly saturated—a period that will vary with the nature of the soil, from twenty-four hours on light soil to perhaps two or three days on heavy soils.

The peculiar nature of the soil on portions of the Yanco orchard requires a modification of the above usual practice. The surface soil, which is a red clay loam, about five inches deep, overlies a whitish cement-like soil, and this again overlies a very impervious clay band. The surface soil sets very hard, but is easily saturated by very slow watering. It is found, in practice, that the whole of the surface soil should be saturated by slow watering of the whole, rather than the ordinary way, where the soil is deeper, by running the water somewhat faster at first until the furrow is wet, and then reducing to a trickle.

In irrigating, as in other practices, slight modifications in general methods are found necessary to meet exceptional cases. The soil may not be uniform in water-absorbing capacity, or the fall may not be uniform.

The methods followed in the portion of the orchard and vineyard referred to are the result of many years' experience on this class of soil and subsoil, and must not be taken as suitable on soil of greater depth or greater permeability, or disastrous results would, perhaps, follow from excessive water on the top portion, and insufficient elsewhere.

The object in irrigation must ever be to secure even distribution, and thus even growth throughout the rows of trees and vines.

The water flows very slowly along the furrows, soaking laterally and saturating the whole area. The apple block, for instance, is 500 feet long, and for the last irrigation given, the water was turned in about 10 a.m. on 31st January; at 4 o'clock on 1st February attention was drawn by some visitors to the fact that the water had only got two-thirds of the whole distance, and actually it did not reach the lower end until about 48 hours after being turned in. The stream was then reduced at the head ditch so that just enough water was admitted to keep the furrows full for another eight hours, after which the water was turned off. A similar state of affairs arrested the attention of the same visitors when the vines were irrigated. In a block 500 feet long, the water had only reached half-way in twenty-four hours. Slow and thorough saturation is the method that gives the results. Ample experience has shown that if the water is run on fast it wets the surface, but does not soak in; if the ground is turned up a day or two later it will be found to be quite dry beneath, though apparently the surface had been a puddle.

The practice is to follow such an application, as soon as the land is dry enough, with a surface cultivation—which, it hardly needs to be said, is as important as any part of the whole business.

The use of manures and fertilisers has received attention in this orchard, and lessons have been learned that interest other irrigators. About fertilisers it is still too soon to express any definite opinion, but about the value of stable refuse and of green manuring there is not the least doubt. The orange block affords an illustration. The soil there was particularly harsh and unkind when planted years ago, but it has been built up by the application of the materials mentioned, and it is now in such free condition that during the present moist season it had only been irrigated once in the middle of January, and it yet retained its moisture and tilth a month later.

"You cannot beat stable manure; farmers should save and use every bit of it," was recently remarked here. That good crops are being obtained from orange trees planted in 1908 on this soil shows what good methods will do. The fact that one irrigation should have been sufficient for a block of citrus down to the end of January is in itself evidence of the value of manuring, for citrus are heavy surface feeders and require more watering through the summer than most crops.

Before leaving the subject of irrigation, it is worth mentioning that one of the most important irrigations of all deciduous trees is that given after harvest. Some growers are inclined to think the season is over for a block of trees when the crop has been gathered. On the contrary it is essential to saturate the soil in the autumn in order to ensure a full and active development of the fruit buds for the following season. The autumn irrigation saturates the subsoil, and it remains moist throughout the winter, being in a condition in the spring to absorb irrigation water. The development of the sugar content of a heavy crop of fruit must be a great drain on both soil and trees, and it is reasonable to suppose that a little care after the crop is off will do much toward ensuring a profitable season the following year. Autumn irrigation, as well as the early spring application, is of importance to all trees, citrus included.

It is of interest to mention, perhaps, that work is being done in this orchard with the selection of buds to maintain the true type of the Washington navel. The coarse degenerated type is being discarded, and several trees can be seen at the present time that have been cut back and budded to better types. Citrus seems to exhibit more tendency to produce coarse unprofitable types than any other fruit. The better type is not only a more thrifty tree and a heavier cropper, but it crops longer than the poorer type.

A good deal has been heard this year about the attacks of black spot and downy mildew on grapes, and in common with many growers on the Murrumbidgee areas, the farm has not escaped the attentions of these diseases. Owing to their presence, in fact, irrigation of the sultanas and currants had to be delayed till the end of January lest the humidity that follows watering should favour the development of the fungi. Advantage was taken of opportune falls of rain, however, the soil being cultivated after each shower. The diseases are fought by swabbing and spraying as recommended by the Department in Plant Diseases Leaflets Nos. 5 and 6. For black spot the vines are swabbed with a sulphuric acid solution, which holds the disease in check long enough for the buds to burst and develop a bit. It is not advisable after that to wait for favourable conditions for disease, as it will develop very rapidly at the first opportunity. Bordeaux mixture is applied when the early buds are bursting, and repeated as necessary according to the season. These applications are at the same time effective in the control of downy mildew, should the weather favour the development of that disease. The results obtained with Burgundy mixture have been just as effective as those with Bordeaux, and washing soda is always obtainable while quicklime is sometimes difficult to get.

To fight these pests on these lines requires a high power spray equipment, of course, but on the area settlers who do not spray have in cases lost the whole of their crops, while those who have sprayed consistently have saved approximately 50 per cent., and those again on soils where it is possible to get the horses on the ground soon after rain should have no difficulty in saving at least 75 per cent. of their crops.

A few references to varieties may be added. The crop of Elberta peaches has been very heavy indeed this season, and a large quantity has been dried. The Elberta block, consisting of some sixty trees in their thirteenth year, has probably carried at the rate of 10 tons of fresh fruit per acre—oh ye wonders of irrigation and of correct cultivation!

An exceedingly handsome peach is yielded by a few trees of Blackburn, a local seedling that was originally grown by a Departmental employee of that name, now deceased. The flesh is perhaps a little red when cut, and it may be that some will prefer the self colour of the Elberta as a dried product, but certainly Blackburn is a pretty and attractive fruit, and in flavour justifies its appearance. It is midseason in maturity, and in an early district would ripen a week ahead of Elberta, and thus would just miss the glut that follows the ripening of the better known variety. The peaches have not had dressings of stable manure, as have some other blocks. This year they were irrigated in November, December and January, and will yet receive the post-harvest watering mentioned above.

The show visitor may imagine that Yanco Experiment Farm's large crop of fruit is almost entirely marketed dry, but on the contrary quite half of it finds its way to Sydney as dessert fruit, and proves the truth of the Department's advice that it pays to grow only the best, and to grade out all poor and small stuff.

The prunes are well known as a dried product. The Prune d'Agen block is carrying well over 2 tons of dried fruit per acre this year, and shares honours as the best with Robe de Sergeant. They cross-pollinate one another, and are thus usefully associated in the orchard. As Robe de Sergeant ripens a little earlier than Prune d'Agen, the drying is extended over a longer period, which is an obvious advantage. In a distant part of the orchard an interesting experiment is being conducted. Some 450 feet from all other prunes are situated a few trees of Robe de Sergeant, to the midst of some of which were brought at blossoming time the blossoms of another variety of prune. It is now observed that the trees so treated have set better crops than trees to which no such blossoms were brought. Apparently, cross pollination favours "Robe"—at least it seems to act as an insurance.

Of apricots, many varieties have been tried, but none is so good as Trevatt, introduced to the area by the Fruit Expert, Mr. W. J. Allen. It originated at Mildura, is a regular cropper, is less affected by frost than other varieties growing here, and is well liked by canners.

Some forty-two varieties of apples have been tried, a number still being quite young; but it is the older standard varieties that still command most attention, viz., Granny Smith, Cleopatra, Jonathan, King David, Yates, Commerce, and Rome Beauty. Apples have exceeded all expectations for such a hot district, but doubtless the fertility of the soil, the regular supplies of water, and the correct methods of cultivation, are the secrets. In this, as in all other fruits, too, pruning is a prime factor, but to teach it requires a book in itself.

List of Fertilisers in New South Wales.

F. B. GUTHRIE, A. A. RAMSAY, R. M. PETRIE, AND F. J. STOKES.

1921 List.

THE accompanying list of manures obtainable in New South Wales, together with their composition, as guaranteed by the vendors, is the result of the revision of the list issued in March, 1920.

The list is published in the interests of the farmers, and it is hoped that it may serve as a guide to those requiring any particular class of manure.

It must be clearly understood that the figures given are not those obtained by analysis of the sample by the Department. They represent the guarantees given by the vendors in accordance with the provisions of the Fertilisers Act.

Where possible, samples have been taken from bulk by one of the officers of the Department, and purchasers may be confident that the manures included in the list are up to the guarantee.

On account of the unsettled conditions obtaining at present, the market value of these manures may alter. An attempt has, however, been made to assign a "unit value" to the fertilising ingredients, viz., nitrogen, phosphoric acid, and potash, as in pre-war years.

A note dealing with the French potash salts appeared in the *Agricultural Gazette*, February, 1920.

A word is necessary in explanation of the column giving the "manurial value" of the manures. These figures are calculated from the composition of the manures as represented by analysis, a definite unit-value being assigned to each of the fertilising ingredients. The units on which the values given are computed are as follows:—

UNIT-VALUES of fertilising ingredients in different manures for 1920.

	Per unit.	
	s.	d.
Nitrogen in nitrate	38	6
,, in ammonium salts	20	1
,, in blood, bones, offal, &c.—fine	30	2
Phosphoric acid in bones, offal, &c.—fine	6	0
Phosphoric acid (water soluble) in superphosphates	7	10
Potash in muriate of potash	11	9

PRICE per lb. of fertilising ingredients in different manures for 1920.

	Pence per lb.
Nitrogen in nitrate	20·6
,, in ammonium salts	10·8
,, in blood, bones, offal, &c.—fine	16·2
Phosphoric acid in bones, offal, &c.—fine	3·2
Phosphoric acid (water soluble) in superphosphates	4·2
Potash in muriate of potash	6·3

To determine the value of any manure the percentage of each ingredient is multiplied by the unit-value assigned above to that ingredient, the result being the value per ton of that substance in the manure. For example, a bone-dust contains 4 per cent. nitrogen and 20 per cent. phosphoric acid :—

4 × 30s. 2d. = £6 0s. 8d. = value of the nitrogen per ton.
20 × 6s. 0d. = £6 0s. 0d. = ,, phosphoric acid per ton.

£12 0s. 8d. = value of manure per ton.

It must be clearly understood that the value thus assigned, depending solely upon the chemical composition of the manure, does not represent in all cases the actual money value of the manure, which depends upon a variety of causes other than the composition, and is affected by local conditions; neither does it represent the costs incurred by the manufacturer in the preparation, such as cost of mixing, bagging, labelling, &c. It is simply intended as a standard by which different products may be compared. At the same time, it has been attempted to make the standard indicate as nearly as possible the fair retail value of the manurial ingredients, and it will be found in the majority of cases the price asked and the value assigned are fairly close.

These figures have been checked by analyses of samples collected by an officer of the Department. It by no means follows, however, that the particular product analysed and here published will be in stock for any length of time or that the prices may not vary.

Some agents guarantee two figures—for instance, "from 16 to 18 per cent. phosphoric acid." In these cases the lower one is shown in the list, as it will certainly be the one the vendors will rely upon in cases of dispute.

Now that the Fertiliser Adulteration Act is in force, the purchaser has only himself to blame if he pays for an inferior article. Every vendor is obliged to furnish a guarantee with every delivery of fertiliser, setting forth its actual composition as determined by analysis.

If the purchaser has any reason to suspect the genuineness of the guarantee, all he has to do is to notify the vendor of his intention to take samples for analysis, in sufficient time to enable the vendor or some person appointed by him to be present. The samples must be taken before the consignment is finally in the purchaser's possession; for example, if the fertiliser is sent by rail, the sample should be taken at the railway station or siding. Three samples must be taken, one being given to the vendor or his representative, the second kept by the purchaser and submitted to an analyst, and the third forwarded to the Department of Agriculture for future reference, in case of divergence in the analyses of the other two. All three samples must be sealed up.

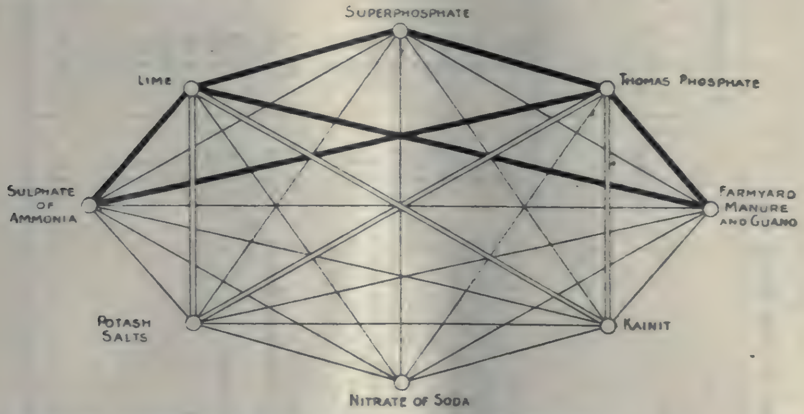
In the case of bonedust, blood and bone manures, &c., the valuation has been made on the assumption that the product is in a fine state of division, and is based on the amounts of fertilising ingredients only; but it must be borne in mind that finely-ground bonedust acts more rapidly than coarse, and that unground fragments of bone only become available as fertiliser very slowly.

In the fourth table are a number of waste products which may in many cases be economically utilised.

When purchasing a manure, always insist on a guarantee of its composition as determined by the analysis.

Never add lime to a manure containing sulphate of ammonia or blood and bone manures, as in these cases loss of nitrogen results: and when lime has been applied to the land, do not use such manures until about three weeks afterwards.

The accompanying fertiliser diagram, which represents in a graphic manner the points to be taken into consideration in the mixing of different manures, is reproduced in the hope that it will be found useful to farmers who make up their own mixtures.



☞ Substances connected by thick line must not be mixed together.
Substances connected by double line must only be mixed immediately before use.
Substances connected by single thin line may be mixed together at any time.

TABLE I.—SIMPLE FERTILISERS.

Manure.	Where obtainable.	Guaranteed Composition.					Manurial Value.
		Nitrogen.	Equal to Ammonia.	Lime.	Potash.	Phosphoric Acid.	
		per cent.	per cent.	per cent.	per cent.	per cent.	£ s. d.
Sulphate of ammonia	Australian Fertilisers Proprietary, Ltd. (successors to Geo. Shirley, Ltd., 7 O'Connell-street).	20·4	24·8	..	..	..	20 9 8
Nitrate of soda ..	,, ,, ..	15·6	18·9	..	..	..	30 0 0
Muriate of potash ..	,, ,,	..	..	..	52	..	30 11 0
,, ,, ..	,, ,, ..	..	..	..	58	..	34 1 6
Sulphate of ammonia	Australian Gaslight Co., Haymarket ..	20·4	24·8	..	..	..	20 9 8
,, ,,	Farmers' Fertilisers Corporation, 31 Hunter-st.	20·4	24·8	..	..		20 9 8
Gypsum	,, ,, ,, ..	..	..	[illegible] Cryst. $CaSO_4$	..	.	....
Muriate of potash ..	,, ,, ,, ..	..	..	..	52	..	30 11 0
,, ,, ..	,, ,, ,, ..	..	..	..	58	..	24 1 6
Agricultural lime. (Burnt lime air slaked).	,, ,, ,, ..	..	..	..	..	..	....
Sulphate of ammonia	Paton, Burns, & Co., 75 York-st. ..	20·4	24·8	..	..	..	20 9 8
Muriate of potash ..	,, ,, ,, ..	..	..	..	52	..	30 11 0
,, ,, ..	,, ,, ,, ..	..	..	..	58	..	34 1 6
Nitrate of soda ..	,, ,, ,, ..	15·6	18·9	..	..	..	30 0 0

II.—Bone and Blood Manures.

Manure.	Where obtainable.	Guaranteed Composition.				Manurial Value.		
		Nitrogen.	Equal to Ammonia.	Phosphoric Acid.	Equal to Tricalcic Phosphate.			
		per cent.	per cent.	per cent.	per cent.	£	s.	d.
B. and B. manure	Kitchen and Sons, Ltd., 365 Kent-st.	5·0	6·07	17·0	37·11	12	12	10
Extra B. and B. manure	,, ,, ,, ...	5·0	6·07	13·0	28·38	11	8	10
Bone and blood	R. S. Lamb & Co., 32 Jamieson-st.	5·0	6·07	11·9	25·98	11	2	3
No. 2—Pure steamed bonedust ...	Wooster Fertilisers, Ltd., O'Riordan-st., Alexandria	3·9	4·75	24·50	53·50	13	4	8
No. 3—Blood and bonedust ...	,, ,, ,, ...	5·76	7·00	13·74	30·00	12	16	2
No. 5—Green bone meal	,, ,, ,, ...	4·01	4·86	24·41	53·30	13	7	5
Excelsior bonedust	M. Gearin and Sons, Old Botany road, Mascot ...	3·29	4·00	21·98	48·00	11	11	2
Bonedust	M. O'Riordan and Sons, O'Riordan-st., Alexandria	3·7	4·5	21·98	48·00	12	3	6
Pure fertiliser	N.S.W. State Abattoirs, Homebush Bay	6·68	8·11	10·87	23·73	15	6	9
Bone and offal	Newcastle District Abattoir Board, 27 Hunter-st., Newcastle.	5·02	6·10	19·89	43·42	13	10	9
Dried blood	,, ,, ,, ,, ...	13·29	16·14	......	......	20	0	11
Sandown blood and bone fertiliser...	J. Cooke & Co., Propy., Ltd., Sandown Works, Parramatta.	6·85	8·32	11·40	25·50	13	15	0
Blood	B. Richards and Sons, Ltd., Riverstone	11·00	13·36	......	......	16	11	10
Blood and bone	,, ,, ,, ...	6·0	7·29	13·00	28·38	12	19	0
Bonedust, B.D. 1	Paton, Burns, & Co., 75 York-st.	3·7	4·49	22·12	49·29	12	4	4
,, B.D. 2	,, ,, ,, ...	3·7	4·49	22·12	49·29	12	4	4
,, B.D. 3	,, ,, ,, ...	3·3	4·01	20·7	45·19	11	3	9
Bone and blood manure, B.B. 1 ...	,, ,, ,, ...	8·0	9·71	8·0	17·46	14	9	4
,, ,, ,, B.B. 2 ...	,, ,, ,, ...	5·0	6·07	17·0	37·11	12	12	10
Bone phosphate	,, ,, ,, ...	......	......	29·77	64·99	......		
Dried blood	,, ,, ,, ...	11·0	13·36	......	......	16	11	10

III.—SUPERPHOSPHATES, MIXED FERTILISERS, AND IMPORTED FERTILISERS.

Manure.	Where obtainable.	Guaranteed Composition.				Manurial Value.		
		Nitrogen.	Water-soluble Phosphoric Acid.	Total Phosphoric Acid.	Potash.			
		per cent.	per cent.	per cent.	per cent.	£	s.	d.
Superphosphate	Australian Fertilisers Protrietary Ltd. (successors to Geo. Shirley, Ltd., 7 O'Connell-st.)	......	17	......	.....	6	13	2
Basic Superphosphate	„ „	......	......	20	......	......		
No. 2	„ „	2	10	......	1	6	10	3
No. 4	„ „	4	8	......	2	8	6	6
No. 5	„ „	3	10	......	7	11	0	10
No. 6	„ „	3	10	......	4	9	5	7
No. 8	„ „	4	11	......	......	8	6	6
No. 10...	„ „	2	13	......	......	7	2	0
No. 11	„ „	......	12	......	4	7	1	0
No. 1 Superphosphate	Farmers' Fertilisers Corp., Ltd., 31 Hunter-st. ...	......	17	......	... ..	6	13	2
No. 7 Complete fertiliser	Wooster Fertilisers, Ltd., O'Riordan-street, Alexandria	5·01	5·00	14·56	2	11	12	9
No. 0 Phosphatic fertiliser	„ „ „	3·30	5·00	20·61	......	11	12	5
Sulphide Superphosphate	Gibbs, Bright & Co., 37 Pitt-street	......	17·0	......	......	6	13	2
Nitro „	„ „	1·6	15·0	......	......	7	15	8
No. 1 Bone and „	„ „	1·5	8·5	19·0	......	8	14	10
No. 2 „ „	„ „	0·8	13·0	19 0	......	8	2	0
Potato manure	„ „	1·25	14·5	16·0	3·5	8	19	10
Orchard „	„ „	2 3	13·0	14·5	4·5	10	0	11
Maize and fodder crop manure ...	„ „	3·0	11·0	14·0	1·0	8	12	5
Root crop ... ... „ ...	„ „	3·25	7·5	11·0	3·0	8	11	11
Leguminous ... ... „ ...	„ „	......	15·5	18·0	2·4	7	9	8
Special orchard manure	„ „	2·3	12·0	12·8	7·25	11	5	5
Superphosphate	Paton, Burns, & Co., 75 York-st.	......	17·0	.....	......	6	13	2

IV.—WASTE-PRODUCTS, ASHES, &C., NOT ON THE MARKET.

Manure.	Original Source.	Water.	Volatile and Combustible.	Nitrogen.	Insoluble.	Lime.	Phosphoric Acid.	Potash.
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Deposit from wool-scouring tanks 1	Liverpool Wool-scouring Works	....	....	·64	....	....	....	·72
,, 2	,, ,, ,,	....	....	1·02	....	....	·16	·39
,, 3	,, ,, ,,	....	....	1·37	....	....	·14	·2
Deposit from breakers	,, ,, ,,	34·47		1·81	50·68	·85	·88	1·60
Sediment from wool-scouring works	Yass	19·57		·59	8·24	·97	....	·20
Scutch	Australian Glue-Gelatin Works, Alexandria.	56·98	....	2·95	....	4·56	None.	None
,, from limed pelts	Hugh Wright, Auburn	5·32	72·42	1·80	3·61	9·36	·89	·20
Decomposed hair and lime	Fellmongery	9·70	57·08	6·86	1·22	26·27	....	....
Tan-yard refuse	Tanneries, St. Mary's	6·43	33·83	2·24	21·43	26·96	·67	....
Tan refuse	....	7·10	50·90	2·62	16·03	18·58	·56	·18
Fleshings from tannery	....	·91	75·37	44·43	5·98	....	1·14	·04
Salt (sweepings from tannery)	....	3·04	....	·70	·38	....	....	....
Wool-waste	....	....	....	8·15	....	....	....	....
,,	....	34·33	28·20	1·97	26·03	2·75	·37	·32
Peat	H. Tager, Moss Vale	72·93	16·68	·35	10·39 (ash).	....	....	....
,,	S. Cook, Pyrmont	49·51	34·63	·75	....	....	·06	·01
Burnt peat	....	....	....	....	84·45	....	·25	·33
Filter-press muck	Cane-mills, Broadwater	16·39	26·07	·22	34·86	13·20	5·98	·44
Megass	Clarence River cane	22·86	67·32	·63	8·61	·30	01	·05
Megass ash	,,	....	....	....	87·69	3·07	·16	·51
,,	Richmond River cane	....	....	....	....	1·11	·21	4·79
Bloodwood ash	....	....	....	....	....	8·47	·27	5·25
Ironbark ash	....	....	....	....	....	....	·82	1·53
Blackbutt ash	....	....	....	....	....	7·27	·04	2·02
Red-gum ash	....	....	....	....	....	....	·38	4·17
Spotted-gum ash	....	....	....	....	....	....	·10	·70
Boxwood ash	....	....	....	....	....	....	·67	1·65
Grass-tree ash	....	·86	1·78	....	33·48	24·94	3·07	5·30
Vine-cuttings ash	....	·49	....	....	60·64	11·34	1·85	3·76
Red-apple ash	....	....	....	....	54·52	13·96	·47	6·00
She-oak ash	....	....	....	....	8·57	42·35	8·85	2·19
Hardwood ash	....	·50	1·35	....	62·38	13·50	1·76	3·09
Ash of wild melon	Stock Branch	....	....	....	....	5·12	4·85	27·08
Wood ashes	....	·30	....	....	21·43	41·37	·35	2·80
,,	Wentworth Irrigation Area	....	....	....	11·12	50·78	·58	3·21
Ash of kerosene shale	Hartley Vale	1·49	27·93	·70	67·59	....	·28	·14
Eucalyptus leaves ash	....	....	....	....	....	....	....	10·54
,, ,,	....	....	....	....	....	....	....	20·50
Camphor laurel ash	....	....	....	....	....	....	....	2·55
Coachwood and sassafras wood ash	....	....	....	....	....	16·16	3·60	13·53
Gidgea wood ash	....	....	....	....	....	40·3	·36	·25
Bracken fern ash	....	....	....	....	56·17	9·64	5·09	4·98
Broom millet ash	....	2·59	....	....	57·23	6·11	4·67	15·53

IV.—WASTE-PRODUCTS, ASHES, &c., NOT ON THE MARKET—*continued.*

Manure.	Original Source.	Water.	Volatile and Combustible.	Nitrogen.	Insoluble.	Lime.	Phosphoric Acid.	Potash.
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Coals (ash)	....	....	....	....	....	·64	·29	·16
Clinker from locomotive boiler	....	....	....	....	....	....	....	·25
Residue from furnace	R. E. Bragg, Marrickville	1·55	35·63	·54	52·40	·64	·43	·09
Sea-weed ash	....	....	....	....	....	9·27	·49	·59
"	....	....	....	....	....	6·29	1·27	17·55
"	....	·43	....	....	56·28	9·39	·47	2·26
"	Manly	....	....	....	43·06	6·52	·91	13·98
"	"	....	....	....	·07	·53	·19	34·30
"	Mr. Harvey, Department	3·25	19·46	....	61·63	4·22	·33	·22
"	....	....	....	....	....	4·63	1·00	31·41
Sea-weed, fresh state	....	80·00	....	·16	....	·41	·09	1·18
Sea-weed	....	41·03	42·49	·14	....	....	·21	·60
Sea-weed, dried	....	18·58	65·97	1·64	15·44 (ash).	3·44	·14	·14
Sea-weed, air-dried	....	3·60	....	....	39·89	....	·42	1·02
Air-slacked lime	....	16·58	....	....	1·88	75·44	....	....
Residue from calcium carbide	....	41·36	....	....	1·08	36·19	....	....
Limestone rock	Queanbeyan	1·10	....	....	4·70	48·20	1·22	....
Agricultural lime	Portland Cement Co.	18·43	....	....	23·80	Hydrate 13·80 Carbonate 43·97	....	....
Gypsum	Marulan	(Crystallised $CaSO_4 = 92·64$)			4·47	....	....	....
Cave deposit, shells, &c.	Cowan, Hawkesbury River	2·11	....	·82	....	35·40	1·59	·88
" "	Macleay River	23·06	16·01	2·43	26·77	13·88	7·40	....
Deposit (coral, shell, &c.)	Pacific Islands	2·13	13·53	·72	....	44·00	3·53	·39
Shells	Pambula River	....	....	....	....	44·59	·10	....
Flue deposit	Maitland	....	....	....	83·75	2·56	·32	·31
"	Liverpool	....	....	....	91·17	·42	1·29	·17
" from sanitary furnace	....	....	....	....	63·53	6·64	1·82	1·61
"	....	6·30	2·45	....	84·89	·32	·35	·38
Night-soil mixed with lime	....	44·33		·74	18·60	7·62	·78	....
Night-soil	Wagga Wagga	6·70		·03	82·19	·44	·28	·69
"	"	9·14		·28	78·92	1·18	·18	·54
"	"	....		·50	....	....	·64	·62
Night-soil preparation, No. 1	....	8·22		3·73	50·22	13·32	9·65	·91
" " No. 2	....	7·20		1·83	29·02	8·05	4·10	·15
" " No. 3	....	25·95		1·64	60·17	1·80	1·61	·70
" " "Pinhoe" manure	....	·92	9·54	·21	57·58	14·71	1·26	·56
" "	F. Artlett, Parramatta	7·33	30·06	2·10	46·38	2·09	1·92	·61
" "	" "	10·11	42·59	4·97	·94	30·12	·39	....
" "	Mr. Halstead, O'Brien's patent	1·54	12·36	·54	77·95	....	·63	....
" "	....	29·52	56·15	2·55	14·33 (ash).	....	....	....

IV.—WASTE-PRODUCTS, ASHES, &C., NOT ON THE MARKET—*continued.*

Manure.	Original Source.	Water.	Volatile and Combustible.	Nitrogen.	Insoluble.	Lime.	Phosphoric Acid.	Potash.
		per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Street sweepings	Sydney Municipal Council	61·63	19·57	·35	15·45	....	·42	·28
Farmyard manure	....	67·96	22·09	·40	8·16	·16	·20	·30
Stable manure	Bathurst	39·26	....	·41	....	....	·27	·67
Fowl manure	....	3·95	16·48	1·47	70·16	2·10	1·94	....
,,	....	1·54	15·23	·86	79·96	·64	·59	·33
Fowlyard manure	....	4·8	14 26	·91	....	3·12	·84	....
Sheep manure	Bathurst	7·73	....	1·06	....	....	·69	1·17
,,	Liverpool Wool-scouring Works	9·71	50·91	1·79	32·26	2·30	·91	·92
Sheep dag	....	....	....	3·04	....	....	....	....
Refuse manure	Abattoirs	12·00	74·51	4·14	6·56	....	1·80	....
Flying-fox manure	....	1·09	35·34	3·34	50·29	1·02	·36	1·15
Fish fertiliser	....	14·47	64·36	10·37	4·52	....	....	....
Shark fertiliser	....	9·02	68·04	10·59	3·86	....	7·27	....
Fish manure	....	10·88	59·26	6·10	5·39	9·82	8·28	....
Rabbit hair, long	Anderson, Oxford-street	8·73	88·64	14·03	3·63 (ash).	....	....	....
,, short	,, ,,	9·72	87·76	14·00	2·82 (ash).	....	....	....
Bat guano	....	14·11	17·69	1·55	28·77	13·72	11·42	....
,,	....	10·86	19·65	2·24	51·95	1·75	3·55	·15
,,	....	13·70	84·35	4·76	3·30	22·28	13·04	trace.
Bat deposit	Cave Flat, Cooradigbee	5·43	12·98	·50	57·64	5·60	12·12	....
Guano deposit	Tamworth	8·75	38·40	6·17	12·85	....	9·24	....
,,	,,	8·42	20·97	3·10	31·89	....	7·87	....
,,	,,	14·55	29·91	3·66	15·81	....	12·98	....
,,	,,	9·35	44·32	6·73	7·33	....	13·17	....
Ground guano	....	4·57	11·44	·21	....	31·90	28·20	·22
Deposit from cave	L. R. Mercy, Ashford	23·75	35·57	3·63	1·65	16·32	11·28	·60
Bone breccia	Queanbeyan	5·71	....	·59	9·48	42·80	3·11	....
Muck from waterworks reservoir	Maitland	4·84	17·55	·74	63·42	4·56	·31	·60
Muck raked from waterhole	....	63·66	29·86	·81	3·80	·96	·10	·06
Sawdust	....	33·52	62·35	·82	....	....	1·70	·05
Decayed wood, bark and leaves, bloodwood	....	57·80		·74	40·68	1·30	....	....
Decayed wood, bark and leaves, pepper-tree	....	79·92		·8	17·77	1·50	....	....
Coconut oil cake	....	8·24	....	3·29	....	....	1·20	1·49
Castor cake	....	18·81	74·08	4·30	....	....	1·83	·86
Pea cake	Java	16·02	....	7·24	....	....	1·46	1·17
Bean cake	North China	14·52	80·32	6·77	....	....	1·33	1·99
Rice husks	....	42·74	42·15	1·07	13·77	·02	·03	·04
Field pea, whole plant	....	88 58	9·97	·55	....	·15	·12	·49
Tares, whole plant	....	83·97	14·96	·73	....	....	·11	·21
Marsh mallow, whole plant	....	79·00	17·86	·85	....	....	·14	·69
Horse bean, leaves and stalks	....	82·87	15·90	·90	....	·05	·11	·54
Refuse from wheat cleaner	State Wheat Office, Pyrmont	9·78	81·52	3·29	8·70	·4	1·18	·66
Whale bones	....	8·53	28·04	3·64	....	....	28·13	....

Pure Seed.

GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture now publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of wheat, oats, maize, sorghum, Sudan grass, potatoes, and other crops, in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

This list is compiled after inspection of the seed and report by a field officer of the Department (preferably during the growth of the crop), and farmers who have pure high-class seed of good quality of any variety of farm crop are therefore invited to communicate with the Under Secretary and Director, Department of Agriculture, Sydney.

The Department does not undertake to buy any of the seed, but recommends the grower by publishing his name in this list. The following list indicates where pure seed, recommended by the Department, is at present obtainable :—

Wheat :—

Billy Hughes	Manager, Experiment Farm, Condobolin.
Bomen	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
	H. M. Hall and Sons, Studbrook, Cunningar.
Canberra...	S. M. Haig, Lisburn, Wombat.
	E. J. Allen, Gregra.
	R. J. O. Berryman, Anicmoore, Botfield's Siding.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Temora.
Clarendon	Manager, Experiment Farm, Condobolin.
Cleveland	W. Burns, Goongoowarrie, Carcoar.
College Purple	Manager, Experiment Farm, Temora.
Comeback	Manager, Experiment Farm, Temora.
Currawa	Manager, Experiment Farm, Temora.
Federation	Manager, Experiment Farm, Temora.
	H. M. Hall and Sons, Studbrook, Cunningar.
Firbank	Manager, Experiment Farm, Nyngan.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Temora.
Florence...	Manager, Experiment Farm, Glen Innes.
	Manager, Experiment Farm, Trangie.
	Manager, Experiment Farm, Condobolin.
Genoa	Manager, Experiment Farm, Glen Innes.
Gresley 83	Manager, Experiment Farm, Temora.
Hard Federation	E. J. Allen, Gregra.
	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Condobolin.
Improved Steinwedel	W. W. Watson, "Woodbine," Tichborne.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Temora.
King's Red	Manager, Experiment Farm, Temora.
King's White	Manager, Experiment Farm, Temora.
Marshall's No. 3	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
Marquis	Manager, Experiment Farm, Glen Innes.
Major	W. W. Watson, "Woodbine," Tichborne.
	Manager, Experiment Farm, Temora.
Penny	E. J. Allen, Gregra.
	W. W. Watson, "Woodbine," Tichborne.
	Manager, Experiment Farm, Temora.
Red Wing	Manager, Experiment Farm, Condobolin.
Turvey	W. W. Watson, "Woodbine," Tichborne.
Warren	Manager, Experiment Farm, Trangie.

PURE SEED—*continued.*

Wheat—continued.	
Warden	W. W. Watson, "Woodbine," Tichborne.
	H. M. Hall and Sons, Studbrook, Cunningar.
	Manager, Experiment Farm, Temora.
Yandilla King	W. L. Forsyth, Braeside, Wallendbeen.
	E. J. Allen, Gregra.
	S. M. Haig, Lisburn, Wombat.
	H. M. Hall and Sons, Studbrook, Cunningar.
	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
Zealand	Manager, Experiment Farm, Temora.
Oats :—	
Algerian	Manager, Experiment Farm, Glen Innes.
Guyra	S. M. Haig, Lisburn, Wombat.
White Tartarian	Manager, Experiment Farm, Glen Innes.
Clovers :—	
Shearman's Clover (roots)	J. H. Shearman, Fullerton Cove, Stockton.
Bokhara Clover or Sweet Clover	A. Sommerlad, Hillcrest, Tenterfield.
Canary Seed :—	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Condobolin.

It is especially desired at the present time to locate reliable sources of seed of Thew, Huguenot, Firbank, and Florence wheats, Sunrise, Ruakura, and Guyra oats, and Cape and Skinless barleys, the demand for seed of which for coastal green fodder far exceeds the visible supply.

In addition to those tabulated a number of crops were inspected and passed for purity, but as the growers failed to forward samples their seed has not been listed.

VINEYARD NOTES FOR APRIL.

THIS month will see the termination of vintaging. In the early districts vintage has already finished, but in the later areas the late varieties such as Doradillo remain to be picked. The practice of turning stock into the vineyard as soon as the last grapes have been carted out is not one to be recommended. Not only are stock liable to injure the wood by pulling off and breaking shoots that may be required for selection of pruning wood, but the fact that the leaves are removed before their functions have ceased work is entirely detrimental to the vine.

As soon as the grapes ripen, the natural process of ripening the wood begins and continues until the leaves fall in the autumn. The ripening consists in the hardening of the woody fibres and the storing up in the pith of a supply of plant food for the following year.—H. L. MANUEL.

NEW LIST OF THE DEPARTMENT'S PUBLICATIONS.

A NEW list of the publications issued by the Department is now obtainable free on application to the Under-Secretary and Director, Department of Agriculture, Sydney.

In reference to the availability of these publications one still hears the remark that "many farmers don't know." The Department is desirous that every farmer, however far away from rail or township he may be situated, should be aware that only the expenditure of twopence for the postage on a letter of application is necessary to put him in touch with the latest recommendations concerning his particular branch of agriculture. The great bulk of the publications are free, and the list covers more than seven hundred different aspects of farming.

Poultry Notes.

APRIL.

JAMES HADLINGTON, Poultry Expert.

SOME hints on the selection of breeding stock appeared in last month's notes. This is not too early to get the breeding stock into the pens, for if the work is left until next month it often results in a late start with the hatching season. The 1st May is the date by which all breeding hens and pullets should, if possible, be got settled in their permanent quarters. The males need not be put in the pens until a couple of weeks later, although no harm will result from making the matings complete, and no good will accrue from keeping the males separated from the hens when, if cockerels, they are 10 months old, or in the case of the older birds after they have finished their moult. The notion that the male birds are best kept by themselves except during the time eggs are required for hatching is unsound, and the practice of entirely segregating the males over the other part of the year leads to many birds becoming sterile, and particularly so with heavy breeds.

Treatment of Laying Stock.

The advice in regard to settling the breeders in their permanent quarters applies equally to laying stock. Any changes of position or conditions made on the eve of the beginning of winter is almost sure to cause loss in egg-production. As was pointed out in last month's notes, autumn and winter egg-production is largely dependent upon early hatched stock, and upon the class of development secured. Nevertheless, the skill with which birds are managed over the coming months will be a big factor in keeping them in laying condition.

Housing and Treatment of Pullets.

Observations over the last few months make it painfully clear that the average poultry-farmer has still much to learn about the handling of forward young stock during the summer months, when it is reaching the laying stage. One of the most common errors seen is the practice of pushing forward immature pullets into the adult houses in large numbers. This, of course, refers to housing in big flocks of 150 and over. Such housing accommodation is recommended for mature stock, but it is very risky for immature birds; and, as a matter of fact, no matter how large the house, the practice amounts to the same thing and is fraught with the same consequences as overcrowding, which is particularly fatal to all growing stock.

The moist weather conditions that have prevailed during the greater part of this summer have been particularly trying to pullets just starting to lay; but the practice referred to has accentuated the trouble to such an extent that, even where no disease has actually made its appearance, the pullets have broken into a moult in many cases fully two months earlier than might have eventuated had they been housed in smaller numbers until more mature.

The safest plan is to house pullets, or for that matter, all growing stock, in not more than fifties until the hot weather is over. If the attendant wishes to ascertain the reason for the resultant troubles due to housing pullets in big flocks, let him visit the poultry houses on some of the almost tropical nights, such as have been experienced this past summer, and test the atmosphere over the pullets that are packed as closely together as is usual, no matter how large the house. He should then be satisfied on this point.

Another matter of importance in regard to preserving pullets from the moult to which they are so liable, is that any change in the food ration to which they have been accustomed is pretty sure to lead to a cessation in laying, followed by a break into a partial or "pullet moult." It is therefore important that once they have started to lay no change be made in diet. The most skilful feeding is necessary with a view to the least possible disturbance in health. It should be remembered that changes and conditions that might cause no appreciable falling off in laying during the spring months might be so fatal in the autumn and winter as to reduce the egg-production almost to vanishing point.

Duck-farming.

Quite a number of inquiries have been made relating to ducks. Time was when duck-farming was quite as profitable as poultry, if not more so. Those were the times of cheap pollard and bran, and when meat offal was plentiful and easily obtained, and, too, when the tallow skimmed from the boiling down of such offal and restaurant refuse would cover the cost of the material, including collection.

There is still a limited amount of this kind of duck-farming carried on; but the opportunities of securing cheap food (and this is the basis of profitable duck-farming) are continually being narrowed by the withdrawal of the materials mentioned, some of which are now being treated by more scientific and up-to-date methods. Hence duck-farming is no longer the profitable occupation it once was.

To make duck-farming pay, the farmer must possess some advantage in the matter of a cheap food supply. Many imagine that green food can be grown for this purpose. Unfortunately green food, while beneficial and necessary, will not take the place of more substantial food. It might be argued that duck-raising must be profitable, considering the prices they now make, particularly at Christmas time; but unfortunately we cannot ensure any large supply of prime ducks for that festive period. It should, of course, be understood that ducklings for table purposes cannot be kept for the same length of time as cockerels, and still remain prime.

In the case of Muscovies the whole period over which the drakes are prime is thirteen to sixteen weeks, so that the time for marketing in prime condition is very short; nor does it pay to keep them longer. Ducks must be marketed when they are ready and not at the pleasure of the farmer. If calculations could be based upon the ducks actually raised without regard to the cost of feeding the adult breeding stock which it is necessary to keep to ensure sufficient eggs for setting, or if ducks were better layers, the case would be altogether different.

However, there are certain situations and circumstances in which ducks will still pay, and a few hints on duck-raising will doubtless be of service.

Black Orpington Hen.

This bird is typical of the breed when it was at the zenith of its fame fifteen to twenty years ago. It was a good class of bird for utility purposes, yet sufficiently attractive to the fancier. (Bred at Hawkesbury Agricultural College, 1916.)

There is no particular difficulty or art in rearing ducks. As a matter of fact, they are often reared with but little care or attention. The case is altogether different, however, where large numbers are reared, as in the case of commercial duck-farming.

Breeds and Varieties of Ducks.

For utility purposes we have a choice of the Muscovy and the popular English ducks, such as the Aylesbury and Pekin, followed by the Rouen and minor varieties. These are all classed as table ducks. We have then the popular Indian Runner, which has the reputation of being such a great layer, but which is an indifferent table duck, being too small.

The Pekin, Aylesbury, and Rouen, and sub-varieties, such as Buff and Blue, can be marketed at two different ages, viz:—nine to ten weeks old, when they have completed their first feather, or at fourteen to sixteen weeks, after their first moult.

Muscovies are a class by themselves, and are as a matter of fact geese rather than ducks. For table purposes, they are at their best (as already stated) at from thirteen to sixteen weeks old.

The Pekin and other varieties take twenty-eight days to incubate, and can be successfully hatched in incubators and reared in brooders, but do not require artificial warmth for more than about two weeks. The Muscovy eggs do not hatch well in incubators or rear well in brooders, and the best method of both hatching and rearing is with the mother duck.

Rearing.

The one fatal circumstance in rearing is allowing the ducklings to get wet, either by rain or by a dewy condition of the grass, and particularly is this important towards evening before they go up to camp. The duck-farmer requires plenty of shed room for rearing if his attempt is in large numbers.

Feeding.

Simple fare is all that is necessary. Pollard and bran, mixed with liver or other meat soup, or with milk, and made to such a consistency that it will hang together well without being sloppy, is best for the first few weeks, when some grain might be allowed in the evening feed. The best practice is to incorporate the grain in the mash after soaking or steaming. Meat offal, rabbits, or the like, might from this stage on form a considerable portion of their feed. Grit and wood ashes should be always before them, and on no account should ducklings be stinted of water, or trouble in the form of staggers will follow. They should have plenty of water to drink, but it is a mistake to allow them water to swim in. That ducklings should not get wet while in the down is a duck-farmer's axiom. Stock ducks should have access to water for a couple or three hours per day, preferably in the afternoon. But this applies more to other breeds than to Muscovies, which can do very well without access to water to swim in.

Diseases.

The most prevalent disease among ducklings is what is known as "white eye." This disease is analogous to roup in fowls, and is very fatal. There is no known cure for it, and when it breaks out the best remedy is a drastic one. Kill and burn all infected birds; they will not live in any case. Then give the ground a rest and a surface dressing of lime; no ducks should be run on it for at least a year. The practice of putting permanganate of potash in the water is quite useless to effect a cure or even to prevent contagion in this disease. The contributing causes favouring an outbreak of this disease are crowding together and insanitary conditions.

Orchard Notes.

APRIL.

W. J. ALLEN and W. LE GAY BRERETON.

Harvesting.

APRIL is still a fairly busy month for the fruitgrower in the late districts. The dispatching of regular consignments will be going on, also the picking of the late varieties.

Where Granny Smith apples will hang without too much waste from windfalls, they will improve much in quality if allowed to do so and picked as late as possible for storage. Late-picked Granny Smiths come out of store a far superior dessert fruit to those early-picked.

Prices for apples have not been too attractive, and we may still expect large quantities from other States. It therefore seems advisable to store late long-keeping varieties, and only to send them forward gradually as the market clears.

The pears Packham's Triumph, Vicar of Winkfield, Winter Nelis, Broom Park (Knight's Monarch) and L'Inconnue could also be cool-stored, if present prices do not warrant marketing them at once.

Great care should be exercised with fruit intended for storage—bruised fruit or specimens with the skin broken cannot be expected to keep. Wrapping fruit intended for storage checks evaporation, and it therefore does not go "sleepy" as quickly as when naked. Wrapping also lessens the liability to stalk punctures. All fruit should be cooled off as much as possible before being stacked in either cold or ordinary storage.

Trials have been made at the orchards at Bathurst and Glen Innes Experiment Farms with a 5-tier 3–3 pack for apples in the Canadian case (20 inches long x 11⅓ inches wide x 10 inches deep) instead of the 6-tier 3–3 given in *Farmers' Bulletin* No. 130, "The Packing of Fruit." The 5-tier 3–3 comes up with the apples placed on "cheek" or "edge," which is superior to packing on the "flat."

The following chart gives the counts for the 3–3 x 5 tiers for the above case, when made up with 11⅓ inches width x 10 inches depth.

7—6 = 195
7—7 = 210
8—7 = 225
8—8 = 240
9—8 = 255

The counts of the other packs for the Canadian case, viz., 2–2 x 4 tiers and 3–2 x 5 tiers remain as given in the bulletin named.

Planting.

In the warmer coastal districts it is not too late to plant out citrus trees this month. In districts where winter frosts occur, provision should be made for covering them for the first two or three years after planting. Bushes or corn stalks are sufficient. It is preferable not to have the covering too thick, as it is found that densely covered trees suffer almost as severely as uncovered trees; it is advisable not to go to either extreme—too much or too little.

If not already carried out, the land intended for planting with deciduous trees this season should be prepared by ploughing and subsoiling. By doing so, the soil is not only sweetened, but a greater portion of any rain that falls will be retained and the trees can be put out early in the planting season.

Where refills are to be planted amongst old-established trees, a large hole should be dug where the new tree is to go and filled in with new soil.

Pests.

The scale insects of citrus trees have, by this time of the year, developed their protective covering and are more difficult to kill with sprays, such as resin-soda wash, than earlier, but there is still time to get an excellent kill with fumigation. Leaflets on this work can be obtained from the Department of Agriculture. The destruction of any infected fruit or fruit-eating grubs should be continued.

Cultivation.

Where cover crops for green manuring have been sown, no further cultivation will be carried out till such crops are ploughed under in the winter.

Where no cover crop has been sown, the autumn ploughing, if not through, can be proceeded with. Such ploughing is especially beneficial in districts of light rainfall, and if irrigation is not available.

Manuring, Soiling and Liming.

As harvesting operations slacken, every opportunity should be grasped to cart all available farmyard manure to the orchard. This material is specially valuable in keeping up the humus content of the soil. The autumn is also a good time for carrying out re-soiling and liming. Needless to say, none of such carting should be done while the ground is wet and boggy.

FRUIT TREES THAT HAVE BEEN BLOWN OVER.

"DURING the heavy rain and gales of December, some of my trees were blown down," wrote a Bankstown orchardist recently. "I put them in position by tying them to stout stakes with rope and bagging around the trunks, and also put earth about half-way up the trunk of each. Should the earth and stakes be taken away when the trees are re-established, or can they be left as they are in case of further gales?"

The correspondent was informed that it would be safer to leave the stakes in for at least another full growing season, thus giving the roots a chance to get a thorough fresh hold of the soil; in all probability the trees would then send out some new big or "anchor" roots. The stakes should be so placed as to avoid any likelihood of their chafing the main stem or limbs, and the trees and bagging should be examined periodically to see that they were not cutting into the bark or harbouring any harmful insects. It was because of the necessity for these precautions that the use of stakes was usually avoided where possible. The banked-up soil should eventually be removed, so that the union of stock and scion should be at least 2 or 3 inches above ground level.—W. J. ALLEN.

Agricultural Bureau of New South Wales.

A SUGGESTED SUBJECT FOR DISCUSSION.

Mr. F. G. Chomley, Manager of Yanco Experiment Farm, in a memorandum on farm homes in this State, remarks that the subject might be taken up by the branches of the Agricultural Bureau with profit. He suggests that personal and home comfort, especially for the women of the household, is not considered in the measure in which it might be, and, indeed, should be, if rural life is to be attractive.

"The general run of wheat farmers," he writes, "are more or less in districts of limited rainfall, severe summer heat, dust, flies, and mosquitoes; but the house itself is too often a collection of galvanised iron, without verandahs, equipped with an undersized tank for drinking-water, and a gardenless track to the stables, which, themselves, are usually of the most meagre description and afford no shelter for the machinery. To this life the men become inured, but the women either drop their bundles or become depressed by the hopelessness and unattractiveness of their surroundings.

"The beautifying of the home is not impossible, except in the absolute desert. Simple architecture does not entail greater expense in construction than unbalanced and awkward designs. Pergolas, shade trees, or bough-shade houses are not for the idle rich only. I have in mind two farms—one having a really good orchard and a good old bush dwelling, wide verandah, fly-screen doors; the other, the most desolate place imaginable, with one pear tree, twelve years old, in front. I know of another dry farmer who has each year as good fruit, vegetables, and flowers, as any produced under irrigation, yet he has only water available that has to be carted from a tank. It is the only farm within miles where any attempt has been made to make the home look like a home. I would certainly suggest that more attention be paid to the domestic side of farming, the improvement of the dwellings, the introduction of domestic conveniences, the planting of shade trees and flowering shrubs, and the provision of water. Lately, I was through a lot of new country in the southern Riverina and saw homes, some new, some old, but with the exception of old station homesteads, I saw nothing that would not give one the blues to think of living in—and some of them close to water, too. This is work for the Agricultural Bureau, and is just as important as more bushels per acre."

REPORTS AND NOTICES FROM BRANCHES.

NOTE.—While gladly publishing in these columns the views of members of the various Branches of the Agricultural Bureau, the Department does not necessarily endorse the opinions expressed.

Adamstown.

The monthly meeting was held on 24th February, when a lecturette was given by Mr. E. B. McPherson on the pruning, cultivation, and manuring of fruit trees and grape vines. Mr. C. Crowther also furnished a useful essay on the peach tip moth. Both gentlemen answered questions to the advantage of the hearers. Steps are being taken by this branch to form a ladies' branch of the Bureau, at which subjects like bottling of fruits, cookery, needlework, poultry-raising, horticulture, &c., can be discussed. The office-bearers are:—Chairwoman, Mrs. Lewis; Treasurer, Mrs. Boekenstein; Hon. Secretary, Mrs. Brock. The example is worth the attention and emulation of other branches, and the movement is sure to be watched with interest.

Auburn.

This branch is holding monthly shows for horticulturists and others, and a show on a somewhat larger scale is to be held on 23rd April.

Bimbaya.

This branch some time ago took steps to organise a non-competitive exhibit for the Candelo show, and the idea was taken up with such enthusiasm by the Candelo Society that a money prize of £10 was offered, and three portions of the district staged exhibits, viz., Bimbaya, Kameruka, and South Wolumla. All three exhibits were excellent and formed a remarkable feature of the show, nothing like them having been seen before in the district. "They were brimful of interest and instruction, and attracted universal admiration," read one appreciative account. Pride of place was awarded the Bimbaya branch, which eclipsed its competitors in scope and arrangement, though in quality the competition was very keen indeed in several lines.

Blacktown.

At the February meeting it was resolved to co-operate with the Kellyville branch in securing public markets for fruit, vegetables, fodder, live-stock, &c., at Parramatta.

Dapto.

At a meeting on 10th February Mr. G. H. Walker read a paper on manuring, from which the following paragraphs are taken:—

MANURING.

In reading general farming literature, our attention is forcibly drawn to the place that manuring has in cultural economy; in fact, there is no farming without it. The manure heap or pit is an essential to be first considered. If an English farmer sells his hay crop he estimates how much manure he must purchase to replace what he has sold in manurial elements with the sale of the hay. The dairyman who sells his milk has to reckon that every cow yielding 700 gallons of milk annually diverts from the food eaten to the milk 42 lb. nitrogen, 16 lb. phosphoric acid, 14 lb. potash. Multiply this by the number of cows giving the approximate 700 gallons and you will gain an idea of what you must replace to maintain the fertility of your land.

Conditions are very different here from what obtains in the colder countries, where animals are stabled and bedded for upwards of six months of the year. Manure is thus made, storage is provided, and in due time a valuable product is carted to the land.

England, Denmark, and other continental countries need to manure largely to get adequate returns—up to as much as 14 tons of farmyard manure to the acre, supplemented with chemical mixtures. America, a comparatively new country which has its hundreds of worn-out and deserted farms, is seriously turning its attention to restoring and maintaining fertility, nearly every farm having its manure-spreader.

These countries all stable their animals; but here, where our animals are never under cover except at milking time, the question arises, where are we to obtain manure? Pig and cattle excreta are spoken of as cold, and horse manure as hot, and as we do not bed the animals a substitute must be found; the compost heap is the only way. As a general method of procedure the following will be found satisfactory:—Make a heap of alternate layers of earth, refuse, and lime. Cover the whole with a layer of earth. When a sufficient quantity of refuse is again collected, place it on top of the heap and cover with a layer of lime and lastly of earth, until the heap is 3 or 4 feet high. The heap should be kept moist, and for this purpose all refuse water from the house should be added; the heap may be conveniently watered by making a hole into the interior and pouring the liquid in. The outer covering of earth has the object of absorbing any ammonia which is evolved in the process of fermentation and by the action of the lime. Urine is especially valuable as a fertilising agent, containing as it does the larger percentage of nitrogen and most of the potash. In England and Denmark it is carted on to the fields and spread by a watering cart after rain if possible. The amount voided by a cow in twelve months is about 9 tons.

We find with all our efforts, though we clean up all the corn husks, stalks, weeds, &c., on our farms, we still need much more fibrous matter. We are mostly graziers, who milk our cattle and farm very little, and do not practice any settled rotation of crops, as they do in older lands, so that we must grow such crops as will replace those elements which are lacking, or are not assimilable.

The winter crops are mostly leguminous and the cultivation of these is always to the benefit of the land, poor soil being enriched and good soil made richer. Our heaviest rains are winter rains, and these crops prevent the soil from washing and so preserve the land from erosion.

Vetches make one of the richest of hays, carrying the same amount of protein as wheat bran, but little less carbohydrates and fats.

The crops advocated by the Agricultural Department and backed up by the wide experience of American agriculturists consist of a cereal and leguminous crop mixed. Rye and vetches, oats and vetches, wheat and vetches, and Canada or grey field peas, will give a large amount of matter for turning under, and should occasion arise that feed is needed (while not a saleable hay) for home use they give a balanced ration and a large quantity of feed. The manure made by the cattle after such feed is of better quality than from cattle, say, only grass-fed.

In the cruciferous family rape, which comes early to maturity, has a prominent place. It may with advantage be fed off once or twice, not too closely, and then the residue may be ploughed in. Its root system penetrates deeply into the soil, and the decaying roots after the crop is ploughed in, carry bacterial action down into the subsoil, and new reserves of plant food are opened up.

I have forborne mentioning any chemical manures, my desire being to impress the use of what we find to our hand, taking into account that greatest of all questions affecting the man on the land—labour and its limitations, mostly limitations.

Glen Innes.

A meeting of this branch was held on 5th February, when a paper on bee-keeping was read by Mr. C. Morton. An interesting account was given of the economy of a hive, and useful hints afforded. A sample of honey taken by Mr. Morton from a box five years ago was exhibited and admired, being still in perfect condition.

Glenfield.

A meeting was held on 25th January, when Mr. Froggatt delivered a lecture that was listened to with interest.

Glenorie.

On 26th February a discussion took place on pruning methods, and a motion was passed cordially approving of the Department's proposal that pruning demonstrations should be conducted in the same orchard for three years.

Interest was also taken in the subject of municipal markets, and some account thereof was given by Mr. W. Marcroft, who had forwarded supplies to the market and then personally followed up their subsequent movements.

Granville.

The second monthly show of flowers and vegetables was held on 19th February, with an attendance of about seventy. Mr. Kraus, of Guildford, gave a very instructive and interesting lecture on the culture of pot plants, and was most attentively listened to.

The competition in several of the sections in the show was exceedingly keen.

The membership of this branch is large and increasing, and the interest in the movement is quite a lively one in Granville.

Hannam Vale.

A practical demonstration of milk-testing was conducted on 12th February, members present expressing themselves much interested in the work. The poorest cow tested 3·0 per cent. and the best 5·4 per cent. On the whole the percentages were good, and the advisability of knowing and culling out the poor cows was apparent.

The branch met on 16th February, when a discussion took place on co-operation, members generally expressing themselves in favour of the principle.

The question whether it is more profitable for a dairyman to arrange for all his cows to come into full milk in the spring and to dry them off in the winter, or to have the cows coming in so that an even supply of milk is maintained all the year round was also discussed. The chairman emphatically favoured the latter course, referring to dairymen who adopted the former course and who gave glowing accounts of the results obtained from the good months of the year, but refrained from saying anything about the others. His own practice was to endeavour to ensure an average supply the whole year round.

Other questions were also profitably discussed.

Inverell.

At a meeting on 17th February the question of making an exhibit of weeds at the show was raised, and it was agreed that the whole of the members, as opportunity offers, collect specimens of all noxious weeds growing on their farms, and bring them to meetings, in order that they may be sent to the Department for the purpose of having every known weed in the district identified and properly named, then displayed in a suitable room in Inverell for the education of all landholders.

It was decided to make application to the Department for an officer to give a lantern lecture on noxious weeds and also on fodder crops and grasses.

The annual meeting of this branch was held on 17th February. The election of officers resulted as follows:—Chairman, Mr. J. Ditzell; Vice-chairmen, Messrs. H. Sissons and G. S. Davies; Hon. Secretary and Treasurer, Mr. W. A. Kook.

According to the chairman's report greater interest had been evinced by members during the year just ended than for a considerable time past, and it could safely be said that farmers' recognition of the value of the Bureau and the benefits that membership offered was becoming sufficiently wide to ensure the progress of the movement. The year's programme had included a number of valuable lectures and demonstrations.

Kellyville.

The branch mounted an exhibit at the Castle Hill show, but was defeated by Castle Hill, which made a big display. The exhibit was subsequently sold by auction, and the Parramatta District Hospital benefited to the amount of £6 15s. 9d.

The branch also co-operated in sending a collection of produce to the city for Bush Week.

Mr. R. N. Makin, Inspector of Agriculture, lectured before the branch on 1st March on vegetable growing, and subsequently answered quite a number of questions.

On 2nd March Mr. F. Whitehouse, M.R.C.V.S., gave an afternoon lecture on diseases of animals, receiving an attentive and appreciative hearing.

Milton.

A meeting was held on 22nd February, when Messrs. C. A. Buchan and A. A. Smart expressed their views as to the best methods of pasture improvement.

The important thing, said Mr. **Buchan**, was to maintain the fertility of the soil. This could be done (1) by proper cultivation, bringing the soil into satisfactory tilth by ploughing and even subsoiling; (2) by drainage where necessary; (3) by crop rotation; and (4) by the use of commercial fertilisers. Crop rotation of itself he considered better than green manuring. The practice of growing corn and oats year after year took too much out of the soil, and a rotation with legumes was the remedy. He suggested sowing of scarlet clover after the last scuffling of maize; this would make excellent feed for winter, and the balance could be ploughed in in the spring. Finally, the selection of tested seed, free from weeds and of high germinative quality, often made the difference between success and failure of a crop.

Mr. **Buchan** also touched on the question of silage and the conservation of fodder.

Mr. **Smart** discussed particularly the judicious use of artificial fertilisers, which necessitated the consideration firstly of the chemical requirements of plant life, secondly of how far the needs were already supplied by the soil, and thirdly of how far any deficiencies in the supply of the needs of particular crops might best be corrected. Different soils required different manures—one paddock that he knew of contained three different kinds of soil. The farmer who obtained the greatest success in the use of fertilisers was the one who studied the different soils and situations he had to deal with.

Departmental Note.—Attention is drawn to some very important points in the foregoing papers: the unsatisfactory condition of the pastures on many coastal farms can be remedied in the ways described. It cannot be expected that the fertility of the soil can be retained without help when there is a regular drain upon it in the shape of butter, milk, and other products, which are sold off the farm. Fertiliser must be used in the repairing of this loss, and in the experience of the Department a mixture of superphosphate and bonedust in equal parts has been found very useful. The principle of rotation of crops with pasture is a very sound one, and the use of some leguminous crop is of very great advantage, as it increases the supply of nitrogen in the soil. Scarlet clover is particularly suitable for this purpose on the South Coast. Good drainage has a very marked effect on pastures. Well-drained land gives a better growth of grass of higher nutritive quality. Consequently, the health of animals is improved and a greater production is obtained. In some cases an apparently luxurious growth occurs on damp and wet places, but such growth is generally not relished by stock and when eaten has no very high feeding value. It is quality which counts more than quantity with grasses, and every endeavour should be made according to the circumstances of the individual farm to promote a good sward of fine nutritive grass.

Mittagong.

A prominent feature of the Berrima show, early in March, was the competition open to branches of the Agricultural Bureau, in connection with which three exhibits were staged. Three local branches competed, viz., Mittagong, Moss Vale, and Penrose-Kareela. The exhibits were the most striking feature in the pavilion, and their excellence and the general attractiveness of the display were much commented on. The exhibits were regarded as more than taking the place of a display by the Department of Agriculture. The whole reflected the resources of the district and the methods of local farmers.

The prizes offered were £25, to be divided among the exhibitors in the proportion of the points awarded by the judges, and a shield valued at £10 10s., to be won three times before becoming the property of any branch. The awards were as follows:—

	Mittagong.	Moss Vale.	Penrose-Kareela.
	Points.	Points.	Points.
Dairy produce and foods ..	60	60	55
Fruit	65	60	50
Vegetables	55	64	55
Grain	75	70	30
Hay, chaff, green fodder, ensilage	75	70	30
Wool	35	40	30
Grasses and vegetable seeds ...	75	70	30
Any other farm produce ...	10	5	...
Effective arrangement	40	50	40
	490	489	320

Moss Vale.

At the December meeting of this branch Mr. E. Breakwell, B.A., B.Sc., Agrostologist, gave a lecture on the grasses suitable for the district.

PASTURES FOR MOSS VALE DISTRICT.

Mr. Breakwell treated his subject under three headings : (1) The pastures best adapted to the district ; (2) how such pastures should be established and maintained ; (3) the growth of supplementary fodder crops, if desirable.

He said the best farmers everywhere had definitely proved that variety, and, therefore, subdivision of grass paddocks produced the best results. Animals liked a change of feed, and also showed a good deal of judgment in choosing the most palatable and nutritious grasses. A paddock of good native grasses like kangaroo grass, love grass, wallaby or white top grass, produced excellent summer feed, and in a good season the excess of growth provided excellent hay. Most native grasses, however, absolutely failed in the cold months of the year. Probably the best winter grass in the State at the present time was *Phalaris bulbosa*, and the success it had met with at Orange, Bathurst, and in New Zealand guaranteed its success here if properly treated. By sowing with Bokhara clover, with which it combined very well, in the early autumn, it would be found that a good growth was made by the winter. It should not, however, be grazed until the root system was well established, and it should not at any time be grazed too closely. If this method was adopted, the pasture would last and provide excellent winter feed for a number of years. A perennial form of prairie grass and tall oat grass also promised well for winter feed, and the Department was prepared to provide free samples of seed for trial.

Spring feed was well provided for by such grasses as cocksfoot, perennial rye grass, and Kentucky blue grass—as a rule the last named germinated very slowly, and it had been shown that a winter crop such as oats should be sown with it. Although summer grasses were not in such demand as winter grasses, still such vigorous growing plants as Sudan grass and Kikuyu grass produced better results than any yet tried.

All pastures should be rested at periodical intervals, and this was easily done if the paddocks were subdivided into fairly small areas. The grasses could then seed and thicken up. Again, a pasture should not be allowed to remain down indefinitely, but it should be turned over every few years or so to clover, root crops, or cereal crops.

The value of oats as a winter cereal had already been proved. Summer crops, like maize and lucerne, should be grown wherever possible. The possibilities of lucerne had not yet been fully realised. In Moss Vale it should grow better on the sloping land, where the drainage was better, as lucerne was a plant that did not like cold or wet feet.

Mullumbimby.

Members of this branch met on 18th February, when the proposal by the Department that an orchard should be selected in which pruning demonstrations could be conducted for three successive years was approved.

Interest was expressed in the Department's proposal to issue a separate publication reporting the activities of the branches of the Bureau.

Pambula.

The feature of the meeting held by this branch on 7th March was a lecture on herd-testing by Mr. A. T. R. Brown, Dairy Instructor.

Mr. Brown divided his subject into four main headings—(*a*) what herd-testing means; (*b*) objects and benefits derived; (*c*) financing and method of raising subscriptions; and (*d*) conduct of the scheme. Each of these aspects was clearly and thoroughly dealt with.

A district exhibit by members of this branch was erected at the local show held on 9th February. The exhibit attracted much favourable comment.

Rydal.

A meeting was held on 22nd February, when a paper, entitled "Pigs for the Farmer," was read by Mr. L. B. Prior. The following paragraphs are taken from the paper:—

Pigs for the Farmer.

The commercial possibilities of this branch of mixed farming are perhaps greater than any other branch, but the subject is so very little known amongst the average run of mixed farmers that Australia becomes less of a pig-raising country each year. It is a fact that in the last ten (10) years the number of pigs has fallen from one and a half millions to about half a million.

The only large pig-raising countries in the world are the United States, Canada, and Denmark, and they cannot possibly satisfy the enormous demand. It is only because of lack of encouragement on the part of our various Governments that Australia does not take her place in the ranks of the world's pig-raisers.

In this country, where we have extremes of weather, we certainly need a very hardy pig, and there is no doubt the Berkshire answers that purpose very well. Then we have the Yorkshire—a white pig, but which will not, unfortunately, stand either extreme heat or extreme cold. The Tamworth, a native of England, is a very hardy animal and should thrive in this district very well; but a Tamworth, in my opinion, is a pig which is only suitable for the farmer who makes a speciality of pig-raising. It requires much more care and attention than the average mixed farmer can afford to give it. Climate influences pigs very much; if it were not for the severe winter in this district I would say that some of the American breeds—Poland China, Chester White, or Duroc Jersey—would be highly profitable, owing to their great weight at maturity.

Let us take the Berkshire as our pig (and we will not be far out in doing so), and begin a herd. First we have to select the suitable sow and boar. The Berkshire, a native of England, was first introduced into the United States in the eighteenth century, and was improved in that country by crossing it with Asiatic pigs. The colour was improved from a half-black spotted with white and brown to the present-day black with occasionally a tinge of bronze or copper colour, white on the feet, face, and tip of tail, and occasionally a splash of white on the arm. The snout should be short and broad and dished, and the face broad between the eyes. Hair should be fine and soft, and set on a smooth and pliable skin. The back is broad, long, and straight; it may on some occasions be slightly arched, but one must guard against the sloping or sagging back, both weaknesses being a sure sign of degeneracy.

The sow which is a generous milker, prolific with her litters, and of quiet, gentle disposition, is certainly the sow for the farmer to acquire, even though she cost a little more. A good breeding sow is a roomy animal with a long, deep body and fully developed hindquarters and pelvic region. Her legs should be short and strong, but entirely free from undue coarseness, and she should carry at least twelve evenly-placed and evenly-formed teats.

The breeding sow, when pregnant, must have plenty of exercise. If she is shut up in a small, poorly ventilated, and ill-kept yard she will not bring fine, healthy litters into the world. A sow is more likely to become barren through over-fatness than any other cause. In such a case, if she is not too far gone she can be brought round by careful and judicious dieting. The boar should be then placed in an adjoining pen where he can see and smell the sow. If this treatment does not bring her round she should be topped off and killed, as a barren sow is only an expense on the mixed farm. A sow will breed when she is eight or nine months old, but it will be found more profitable, if it is possible to do so, to keep her until somewhat older. The litters of sows between twelve and eighteen months old are usually small, and the young do not make the headway noticeable in litters produced by older sows. It has been established that a sow which produces less than seven at a litter is hardly worth while keeping for breeding unless she is a remarkably fine type of animal.

It is even more important to have a really good boar, as he is the sire for many sows. No matter how good-looking a boar may be, if he has no breeding of any account in him it is only ruining the future of the herd to breed him. Even if he is well bred, and has been starved or overfed, or perhaps overworked by a previous owner while young, his progeny will be a weak and degenerate lot. What may be termed the first point in the selection of a boar is not only is he well bred, but has he had good management from the day he was born? Masculinity is a characteristic which must always show great prominence, and this is indicated by strength and vitality, but need not and does not mean coarseness in build. Broad hams and shoulders, a good girth, strong legs and upright feet are main points in the choice, and a clean elastic skin, with soft, smooth hair free from all roughness and hard bristles denotes a good, healthy constitution. It is imperative that he should have a quiet disposition. A bad-tempered boar is very often the sign of a short-tempered owner; and I feel sure that you will never regret spending what you may consider very valuable time in treating your boar with great patience. The boar may be used for service when he is 9 months old, but it is not advisable for him to be allowed more than two sows at this age. When he is past his 12 months then it will be safe to have reasonable service; and if he is well cared for he will be at his best for stud purposes from 18 months to 5 years. Between the age of 2 and 5 years, American breeders consider sixty sows a season a fair thing for any boar, which is rather more than in Australia.

Good housing applies, of course, equally to the sow and the boar. To house a pig comfortably to the best advantage, an elaborate building is not necessary. The average farmer need only see that ample light, warmth, and shelter are available. It is necessary, however, that the sty and its run are thoroughly drained and kept very clean. Nothing breeds disease quicker than an accumulation of dirt and filth, and no animal is more susceptible to disease than the pig. The building should be placed on a sandy or gravelly soil, in preference to a loamy or peaty soil, as the former provides a natural drainage. It is advisable to floor the sty itself when suitable material is available. A very sad mistake, which quite a number of pig-raisers have made, is to concrete the floors. Of course, concrete can be kept nice and clean, but pigs are rather susceptible to rheumatism, and a concrete floor will give it to them if they are at all inclined that way. Stone or brick, owing to their greater warmth, make a much more suitable floor, although not as neat. If the sty is floored in this manner, it is advisable to have an overlay or second floor built of wood, which fits into a corner of the sty and which can be easily removed and cleaned.

The matter of feeding properly and scientifically has been sadly neglected by farmers in this country. The pig is rightly credited with the ability to use up nearly everything in the way of food, and sometimes unwholesome food is used, just because the victim happens to be a pig. The pig has been called "the farm scavenger," but it must be borne in mind that when the animal is allowed to runt about for its food, prime quality pork and bacon cannot possibly be expected. Certainly the digestive powers of the pig are marvellous; but any old food is not good enough if choice flavour and good curing qualities are desired. Food has much more influence on the flavour of the flesh in this animal than in any other animal, and scientific feeding will certainly repay the farmer. A fact that is usually overlooked in pig-feeding is that the pig is just as much a grass-eating animal as the horse or sheep, and as grass is an aid to digestion it is not right that the pig should be deprived of its natural corrective. American farmers were the first to put into practice the idea of grazing pigs just as one would graze sheep. All that is necessary is a movable sty and a supply of water. The sty is usually on the same lines as a huge dog kennel, mounted on slides to enable it to be moved from one part of the grazing paddock to another. In America pigs are grazed on lucerne. Farmers in this district have remarked to me on several occasions, "Yes, when green feed is available feeding may not be a problem, but what about winter time?" Well, in winter time perhaps the greatest attention is necessary. Root crops, pumpkins, lucerne hay, and clovers are undoubtedly the best foods available in this country. Potatoes and artichokes offer the best succulence, and also have the laxative qualities of green feeds, but care must be exercised when using these foods as their laxative effects are sometimes too great. Then another good substitute for green feed—just as good for a horse as a pig—is steamed chaff. The idea is to get a cask or large box, drill half-inch holes in the bottom, fill it with a mixture of chaff and bran or any other by-product of wheat or oats, and pour a bucketful of boiling water over it. Throw several bags over the top to prevent the escape of steam and in twelve hours you have a very palatable and a very corrective food.

Consumers nowadays desire more lean and less fat on pigs than formerly, but this lean is not produced by scanty feeding; it is produced by scientific feeding, which produces the alternate streaks of fat and lean. The first 100 lb. of pork costs very little to produce in a well-bred pig; 1½ lb. of grain per day will maintain a pig at this weight, but if the ration is increased to 4 lb. of grain per day, the increase in the weight of the animal is 1 lb. per day. Grain alone, however, should not be fed to pigs; either green feed or steamed chaff should be given as a preventive against "balling" in the stomach.

Pigs are very partial to charcoal, as it supplies the mineral matters necessary for the production of firm flesh. Feeding a little treacle dissolved in hot water with the food occasionally will have the effect of imparting a sweetness to the flesh. Although at birth the young pigs weigh only from 2 to 3 lb. each, they will weigh from 18 to 20 lb. each at 6 weeks old if the mother has been properly fed. With the separated milk usually available on the mixed farm, the fattening of pigs is a very simple matter. Separated milk must not be fed to pigs until it is at least 12 hours old, as it is full of minute bubbles which are extremely likely to cause diarrhœa. Topping off a pig ready for killing is accomplished in anything from two to three weeks, by using a purely grain ration with just the amount of greenstuff necessary to ensure the absence of grain "balling" in the stomach.

No paper on pigs is quite complete without a few words on diseases. Of course, prevention is the best policy always, and the best way to prevent disease is to raise pigs of strong vitality. This is accomplished by using only strong and pure breeding stock which are not closely related, feeding in such a way that the organs of the animal are in natural working order, and keeping the surroundings of the animal clean.

Perhaps the most deadly disease in existence in the pig world is swine fever or swine plague. It is communicable by means of food, by means of persons who have been in contact with diseased pigs or their sties, and it is even communicable through the germs being distributed in the atmosphere. Animals that become affected show dulness and thirst, and develop red spots on the head, neck, and ears, and occasionally about the thighs and tail. The animal is inclined to hide itself wherever possible, or to get into a corner, and lie on its belly, for there is great weakness in the limbs. The snout is dry and spotted red. On account of the contagiousness of this disease treatment is out of the question, and the animal must be slaughtered and burnt, and all pigs which have been in contact with the diseased animal must be immediately quarantined and watched. The sty must be destroyed by burning, and that portion of ground never used again for pigs. Any instruments, knives, &c., must be sterilised by washing with one part carbolic acid to twenty of water. All this may seem needless, but this is the most deadly of all pig diseases, and the precautions are only fair to the breeder and his neighbours. Strangely enough, this disease has not yet been discovered among any other animals. It appears to be wholly and solely a pig disease.

Tuberculosis is another serious disease, although it is not very often found in pigs. This disease has not got the outstanding symptoms of swine fever, but a swelling may be noticed in the neck and joints, accompanied with diarrhœa. The animal will show loss of condition and generally dies in a very short time. The main source of contagion is feeding on skimmed milk from a tuberculous cow, and it has been known for an affected pig to pass its disease on to a human being. Slaughtering and burning is about the best thing I know of for a tubercular pig.

Diarrhœa is usually only found in pigs which are suckling or which have only lately been weaned. The causes are poverty of the mother's milk, improper food, cold and damp sties, and sudden changes in the weather. Green food given to sows with litters when they have long been without it is not an infrequent cause. Young pigs that are affected, if old enough to eat, should be given a dry mixture of flour and arrowroot; grown animals should be given dry grain and sweet skimmed milk. Soot mixed with the food is also a very good cure.

Constipation is merely an indication that a change of diet is necessary. Withhold all solid food for twenty-four hours and feed on a mash for that period. Then give a tempting mash in which is mixed four tablespoons of Epsom salts. A pig which is regularly fed and has plenty of green feed is, however, very little troubled with this complaint.

Inversion of the rectum or protruding anus is a fairly common complaint with pigs. It generally affects those which are badly fed and housed, although it sometimes arises through constipation and farrowing. The best thing to do is to empty and clean the protruding part as soon as it is noticed, and using warm water or oil push the protruding part back. The animal must have no solid food for a couple of days after this. If constipation is the cause, 2 oz. of castor oil should be given.

Some breeders have had pigs lose their tails. This is due to sores caused through dirty sties and nesting places. If the sores are not too fully developed, they may be treated with lard with which is mixed a little drop of carbolic acid. Cleanliness, however, is the preventive in this case.

Tennyson-Kurrajong.

This branch has taken a fresh lease of life, and on 6th December elected the following officers for the year:—Chairman, Mr. H. A. Wood; Vice-chairman, Mr. R. Allison; Treasurer, Mr. A. McMahon; Hon. Secretary, Mr. H. S. Farlow.

Twelve of the members visited Hawkesbury Agricultural College on 21st January, an instructive and enjoyable time being spent.

During February Mr. W. le Gay Brereton, Assistant Fruit Expert, delivered a lecture on fruit pests and their control, being listened to by a large number of members. A number of questions were answered subsequently, and the event proved a very profitable one.

The monthly meeting was held on 7th March, when Mr. H. A. Wood, district Fruit Inspector and chairman of the branch, gave an instructive lecture on the preparation of land and planting for an orchard. This branch anticipates the swelling of its membership by a number of soldier settlers shortly.

Tingha.

The monthly meeting on 5th March was well attended, notwithstanding heavy rain. Several items of business were dealt with, and, among other things, it was decided to invite public discussion of the advisabilty of forming a Pastoral and Agricultural Association to conduct future shows in the district.

A programme of lectures and demonstrations on useful subjects has been arranged for the ensuing three months.

Warrah Creek.

A meeting was held on 17th February, when good progress by the working-bee with the clearing of the recreation ground was reported.

It was decided to ask the Pastures Protection Board to erect or assist in the erection of a sheep-dip.

The question of lamb-raising was raised by the reading of a short paper from the *Agricultural Gazette*; several farmers believed a Lincoln ram would leave as many twins as a Border-Leicester.

Wellington.

A special meeting was held on 11th February, when the business was chiefly the resignation of the Secretary, Mr. L. Jurd, and the appointment of a successor. The resignation was received with expressions of regret, and a presentation was made to Mr. Jurd as a mark of appreciation of his services to the branch. Mr. H. E. Hobson was appointed Hon. Secretary.

Preliminary arrangements were made with a view to a district exhibit at the local show.

Messrs. Kimbell and Flanagan gave an account of the Orange conference of Bureau delegates.

Wentworthville.

A lecture on leguminous plants was delivered under the auspices of this branch on 2nd February by Mr. R. N. Makin, Inspector of Agriculture.

The habits of legumes were described, the fixation of nitrogen on their roots by symbiotic bacteria, their value as a rotation, and also for green-manuring purposes.

Wetherill Park.

Mr. C. C. Crane, Organising Inspector, visited the branch on 14th January, and delivered a lecture that was evidently appreciated by hearers.

The secretary of this branch reports enhanced interest in its activities, and the staging of an exhibit at the Fairfield show.

A discussion took place at the last meeting on the mortality among cattle grazed on Sudan grass, and the Department was applied to for information on the subject, as a good deal of Sudan was being grown in the district. In reply to this inquiry the Agrostologist remarked that the case so much discussed in the press of late was the only one of the kind known. It was advisable, however, that hungry stock be not grazed on young Sudan grass.

Yarrunga-Avoca.

The branch met on 22nd January, when a good deal of routine business was transacted. Arrangements were advanced for several useful fixtures. An effort is being made to arrange for a lecture and demonstration on blacksmithing for farmers. The Department has pointed out that the most satisfactory instruction would be obtained by members taking the blacksmith's course at the Winter School at Hawkesbury Agricultural College.

The model beehive is at present in circulation among members.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1921.

Society.	Secretary.	Date.
Coonabarabran P. & A. Association	Geo. B McEwen	April 7, 8
Upper Manning A. and H. Association (Wingham)	D. Stewart	,, 13, 14
Narrabri P., A., and H. Association	C. C. Baker	,, 13, 14, 15
Orange A. and P. Association	G. W. Williams	,, 18, 14, 15
Clarence P. and A. Society (Grafton)	L. C. Lawson	,, 13 to 16
Wellington P., A., and H. Society	A. E. Rotton	,, 19, 20
Dubbo P., A., and H. Association	F. Weston	,, 27, 28
Hawkesbury District A. Association (Windsor)	H. S. Johnston	May 12, 13, 14
Murrumbidgee P. and A. Association (Wagga)	A. F. D. White	Aug. 23, 24, 25
Corowa P., A., and H. Society	J. D. Fraser	,, 30, 31
Forbes P., A., and H. Association	E. A. Austen	,, 30, 31
Grenfell P., A., and H. Association	G. Cousins	,, 30, 31
Cowra P., A., and H. Association	E. P. Todhunter	Sept. 13, 14
Cootamundra A., P., H., & I. Association	C. H. Inson	,, 14, 15
Northern A. Association (Singleton)	J. T. McMahon	,, 15, 16, 17
Temora P., A., H., and I. Association	A. D. Ness	,, 20, 21, 22
Henty P. and A. Society	H. Wehrman	,, 27, 28
Deniliquin P. and A. Society	P. Fagan	,, 28
Narrandera P. and A. Association	W. Cantong	Oct. 11, 12
Lismore A. and I. Society	H. Pritchard	Nov. 23, 24

To Treat Snake Bite in Stock.

Snake-bite in stock usually passes unnoticed, the animal being found dead. Lines of treatment can, however, be suggested if a case comes under observation before death.

If bitten about the face, or such thin-skinned parts, there will be a marked swelling, and possibly the marks of the teeth may be detected on careful examination. If, however, the animal is bitten about the legs, the swelling will not be so marked, and may be unnoticed—the real cause being unsuspected. The general symptoms are drowsiness, due to depression of the heart, sometimes followed by paralysis, unconsciousness, convulsions, and death.

When it has been ascertained where the animal has been bitten the bite should be ligatured, if possible; it should then be scarified or cut out, and permanganate of potash rubbed well in. The general treatment is the administration of large doses of one or other of the following stimulants:—

1. Hypodermic injections of strychnine—an eighth to a half grain, according to the size of the animal. These should be given at regular intervals to prevent the animal becoming too drowsy.
2. The administration by the mouth of large doses of alcohol—brandy, whisky, rum, &c.
3. The administration by the mouth of large doses of ammonia, preferably the strong liquor ammonia sold by chemists, 1½ to 4 drams (according to the size of the animal) diluted with at least forty times its volume of water.

Intervals of at least two hours should separate the application of such treatments, which should be repeated until the effect of the snake bite poison has been overcome.—Veterinary Officers of the Stock Branch.

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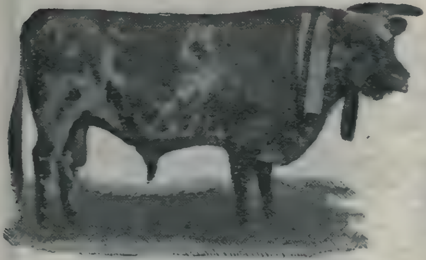

EMBLEM OF DARBALARA (100).

Banker (5) ex Madame (406).

Sydney R.A.S. Records :—1st and Champion, 1910, 1911, 1912, 1913, 1914, 1915 and 1916. First in Bull and Progeny, 1913, 1915 and 1916. Unbeaten for 7 successive years.

KITCHENER OF DARBALARA (409).

Emblem of Darbalara (100) ex Lily II of Darbalara (1,019).

Sydney R.A.S. Records :—1st, as yearling, 1914 ; 1st, 2 years old, 1915 ; 1st, 3 years old, 1916 ; 1st and Champion, 4 years old, 1917 ; 2nd and Reserve Champion, 1918 ; and 1st in Bull and Progeny. Unbeaten for 5 years, except once by ELECTED OF DARBALARA, bred by the same Stud.

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World's record for a Shorthorn Cow, 365 days.

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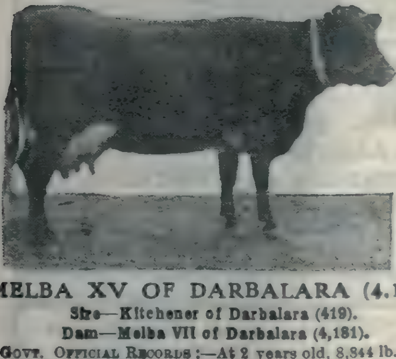
2 years old, for 273 days, 8,077 lb. Milk, 412 lb. Butter. 4 years old, for 273 days, 14,622 lb. Milk, 678 lb. Butter. 6 years old, for 273 days, 14,871 lb. Milk, 836 lb. Butter. 6 years old, for 365 days, 17,364 lb. Milk, 1,021½ lb. Butter.



MELBA XV OF DARBALARA (4,168).

Sire—Kitchener of Darbalara (419).

Dam—Melba VII of Darbalara (4,181).

Govt. Official Records :—At 2 years old, 8,344 lb. Milk, 461 lb. Butter for 273 days ; 3 years, 13,510 lb. Milk, 707 lb. Butter, for 273 days ; 4 years, 18,131 lb. Milk, 930 lb. Butter, for 273 days. A record M.S. Test of the World for the period.

R.A.S. Records :—1st Prize as 2 year old in Milk, 1918 ; winner of *Sydney Morning Herald* and *Mail* Special Prize, 1920, highest yield all breeds ; winner of M. S. Association's Special Prize.

MELBA XI OF DARBALARA (4,165).

Sire—Union Jack of Darbalara (631).

Dam—Melba VII of Darbalara (4,181).

Govt. Official Records :—At 3 years old, 9,165 lb. Milk, 481 lb. Butter for 273 days.

R.A.S. Records :—1st Prize 2 year old and Reserve Champion, 1917 ; 1st Prize 3 year old and Champion, 1918 ; 1st and Champion, 1920, M. S. Section ; 1st in yield of milk, 1st in Lactation Test Prize, and 2nd in Champion Butter Prize.

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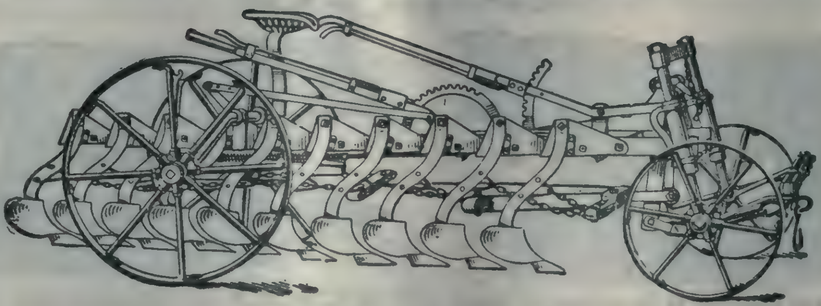

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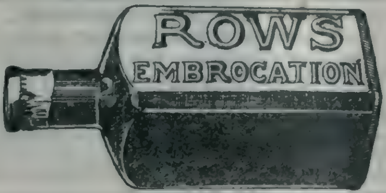

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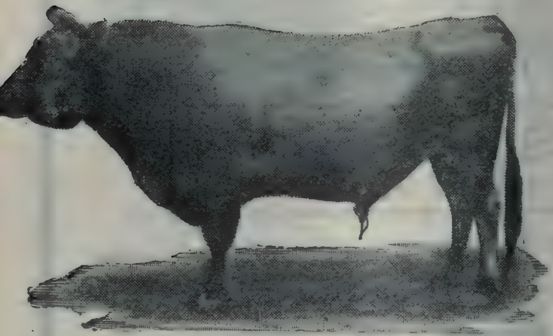

JERSEY BULL.

Xmas Fox (imp.) (947.)

Sire, Silver Fox (10,097, E.H.B.)

Dam, Malvoisie (Vol. XX, E.J.H.B.)

Butter record of Dam, Royal Counties Show, England, 2 lb. 6¼ oz. from 49 lb. milk in 24 hours, 165 days after calving.

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Yield of Dam, 8,150 lb. milk; butter yield, 1 lb. 11 oz. from 32 lb. milk in 24 hours as 3-year old.

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LORD SILVERMINE II of Banyule (yield of Dam, 7,592 lb. milk and 461 lb. butter in 273 days.)

JERSEY COW.

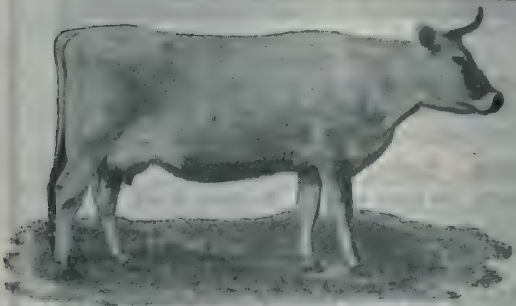
Glory Quayle (4,822)

Yield, 8,592 lb. milk and 495·48 lb. butter in 273 days (second calf).

Sire, Xmas Fox (947) (imp.)

Dam, Egypt's Glory (383).

Yield of Dam, 6,154 lb. milk and 399 lb. butter in 365 days as 3-year-old.



JERSEY COW.

Wagga Jasmine (2,779).

Yield, 11,864 lb. milk and 894·94 lb. butter in 365 days.

Sire, Kaid of Khartoum (949).

Dam, Wagga Larkspur.

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MILKING SHORTHORN BULL.

Melba's Emblem of Darbalara (461, M.S.H.B.).

Sire, Emblem of Darbalara (100 M.S.H.B.)

Dam, Melba III of Darbalara (1058 M.S.H.B.)

Yield of Dam, 15,239 lb. milk and 653·65 lb. butter in 365 days.

Melba's Emblem of Darbalara was Reserve Champion Milking Shorthorn Bull, R.A.S., Sydney, 1920.

OTHER SIRES IN USE:

RUTLAND OF DARBALARA (575 M.S.H.B.), by Emblem of Darbalara (100).

Yield of Dam, 12,324 lb. milk and 579 lb. butter in 365 days.

COMRADE OF DARBALARA (Vol. V, M.S.H.B.), by Silver Mine of Darbalara (592).

Yield of Dam, 8,436 lb. milk and 398 lb. butter in 273 days as a 2-year old.

NEWHAVEN OF DARBALARA (Vol. V, M.S.H.B.), by Lily's Cupid of Darbalara (431) (half-brother of Emblem of Darbalara).

- Yield of Dam, 9,163 lb. milk and 419 lb. butter in 365 days when 16 years old.

MILKING SHORTHORN COW.

Gibson Girl (1,465, imp.).

Yield, 10,702 lb. milk and 494·79 lb. butter in 365 days.

G. VALDER,
Under Secretary and Director, Department of Agriculture, Sydney.

PRICE LIST OF PURE BRED PIGS FOR SALE AT HOSPITAL, GLADESVILLE.

(The prices quoted hold good for the current month only.)

No.	Description.	Sire.	Dam.	Date Farrowed.	Price Each.		
				1920.	£	s.	d.
2425–26	Large York. Boars	Hawkesbury Ferryman	Brighton Lass ...	May 17	15	15	0
2440–1	Large York. Boars	King Charles II ...	Glad'ville Empress II...	June 2	13	13	0
2446–47	Large York. Boars	Hawkesbury Ferryman	Brighton Lady ...	June 20	13	13	0
2458	Mid. York. Boar	Gladesville Grand Boy	Gladesville Lila ..	July 12	13	13	0
2496–7–8	Mid. York. Boars		Gladesville Joan ...	Sept. 8	12	12	0
2510–11	Large York. Boars	King Charles II	Glad'ville Empress IV	Oct. 1	11	11	0
2513	Large York. Sow				10	10	0
2524	Mid. York. Boar	Sundon Syd. (Imp.)	Gladesville Snowdrop..	Sept. 30	13	13	0
2526–27	Large York. Boars	Hawkesbury Ferryman	Gladesville Empress V	Sept. 30	12	12	0
2531	Berkshire Sow ...	Whitley Wales (Imp.)	Herrison Queen V	Oct. 23	11	11	0
2547–48	Large York. Boars	Hawkesbury Ferryman	Brighton Lass ...	Nov. 29	11	11	0
2549–50	Large York. Sows				10	10	0
2553–4–5	Berkshire Sows ...	Wodonga Pat	Herrison Queen VI	Dec. 5	10	10	0
2558	Berkshire Sow ...	Herrison King ...	Short Face Jane ...	Dec. 6	10	10	0
2561–62	Berkshire Sows ...	Whitley Wales (Imp.)	Gladesville May ..	Dec. 22	10	10	0
2563	Large York Boar	Hawkesbury Ferryman	Brighton Lady ...	Dec. 22	10	10	0
2564–65	Large York. Sows				9	9	0
2569	Large York. Boar	King Charles II...	Gladesville Lady..	Dec. 22	10	10	0
2570-1-2	Large York. Sows				9	9	0
2574-75	Berkshire Boars ...	Whitley Wales (Imp.)	Goomalabee Patricia ...	1921 Jan. 10	11	11	0
2576–77	Berkshire Sows ...				10	10	0
2578–79 2580–81	Mid. York. Boars	Gladesville Sundon	Gladesville Lila ...	Jan. 20	10	10	0
2584–5–6	Mid. York. Boars	Gladesville Sundon	White Rose ...	Jan. 20	10	10	0
2587–88	Mid. York. Sows				9	9	0
2589–90	Berkshire Boars ...	Wodonga Pat ...	Gladesville Queen III ...	Jan. 21	10	10	0
2591–2–3	Berkshire Sows ...				9	9	0
2594–95	Berkshire Boars ...	Wodonga Pat ...	Tarban Jane II ...	Jan. 24	10	10	0
2596–97	Berkshire Sows ..				9	9	0
2598–99	Berkshire Boars ...	Wodonga Pat ...	Herrison Queen IV	Feb. 6	10	10	0
2600–1	Berkshire Sows ...				9	9	0
2602	Berkshire Boar ...	Wodonga Pat ...	Gladesville Duchess III ...	Feb. 6	10	10	0
2603–4–5	Berkshire Sows ...				9	9	0
2606–7	Berkshire Boars ...	Whitley Wales (Imp.)	Herrison Queen III	Feb. 8	11	11	0
2608–9–10	Berkshire Boars ...				10	10	0

If it is desired to procure any of the above pigs in farrow they would be kept until old enough for service, put to suitable boars, and retained until sure of being in farrow, for £19 19s. each sow. For this sum pregnancy will be guaranteed, and to do this it may be necessary to keep sow here until 10 or 11 months old.

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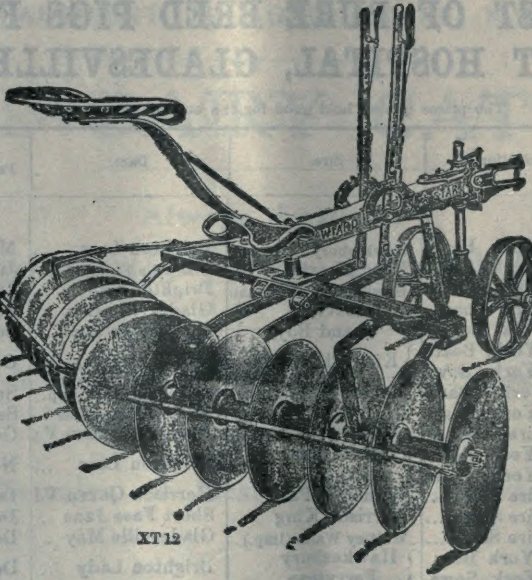
April, 1921.

W. A. E. LEWIS, Manager, Gladesville Hospital.

All communications should be addressed to "The Manager," Mental Hospital, Gladesville.



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3ft. wide, 8 discs, 16in. size of discs	£16/10/-
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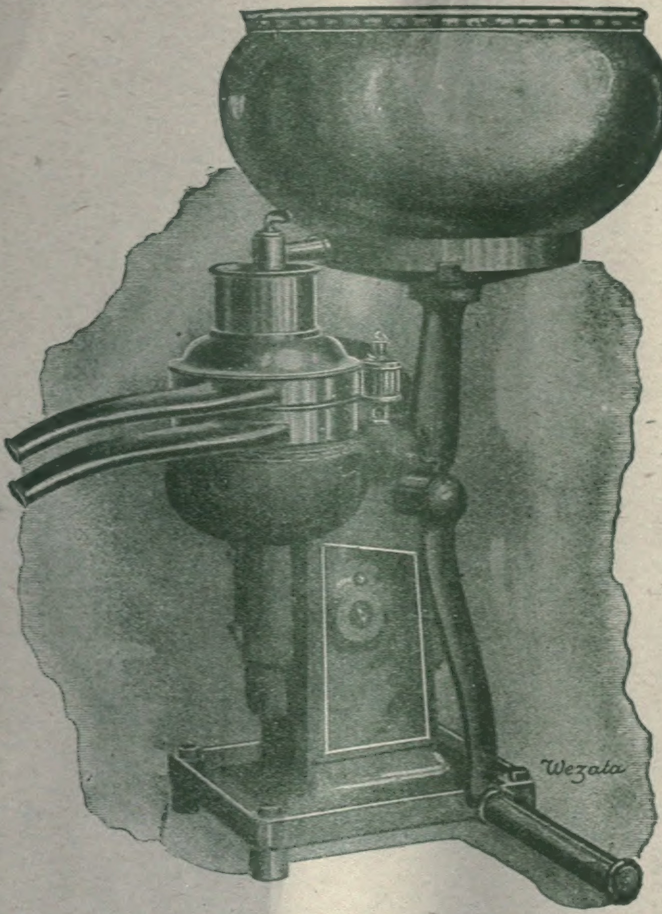

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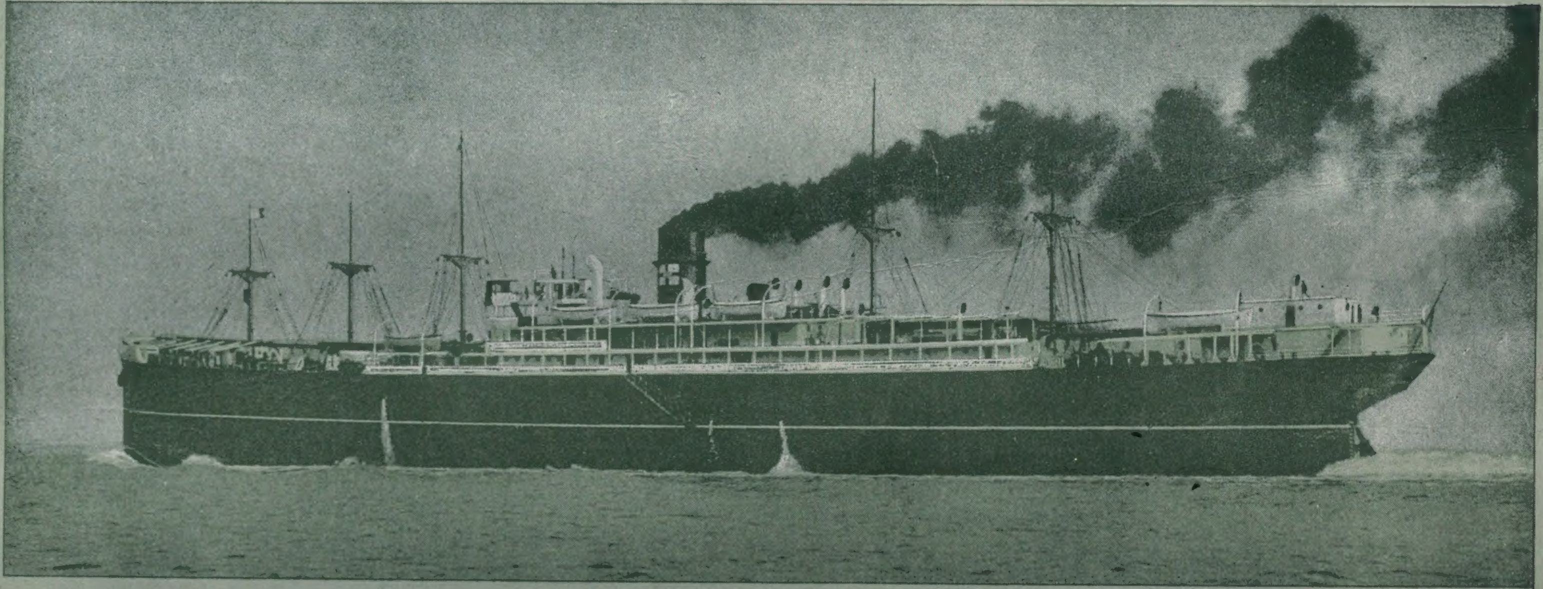

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